FOUNDRY TRADE JOURNAL

EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

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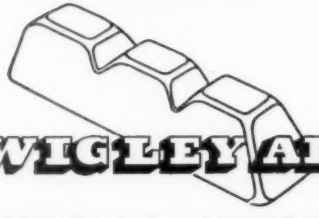

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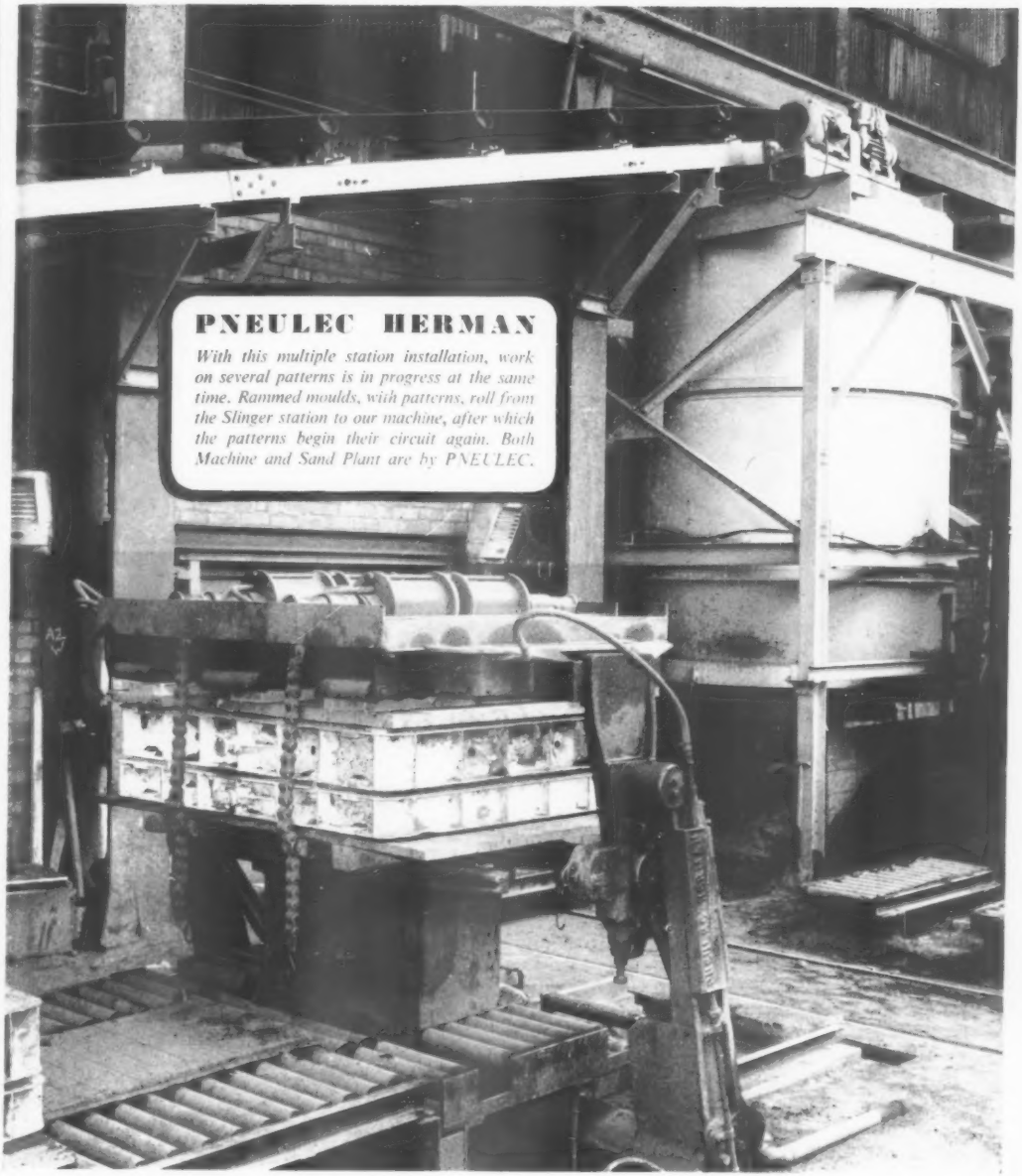
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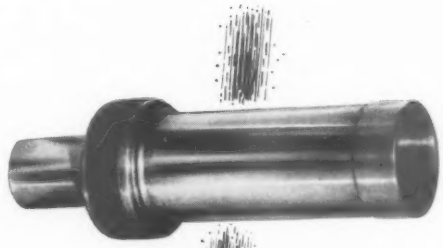

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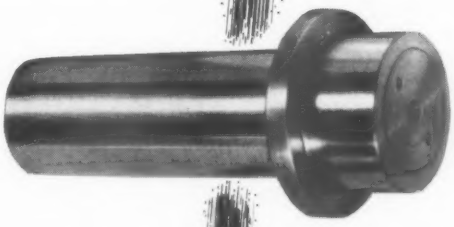

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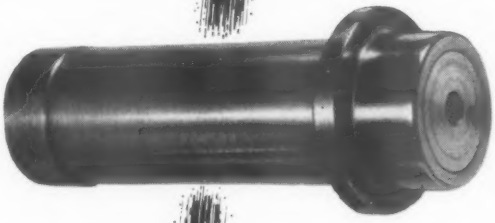

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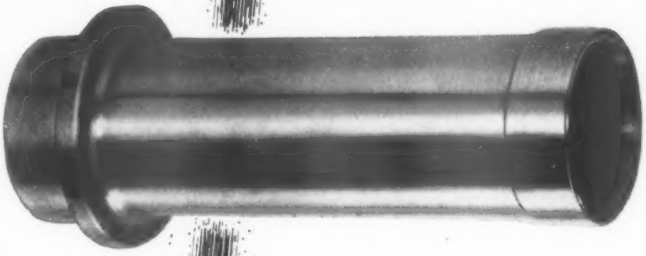

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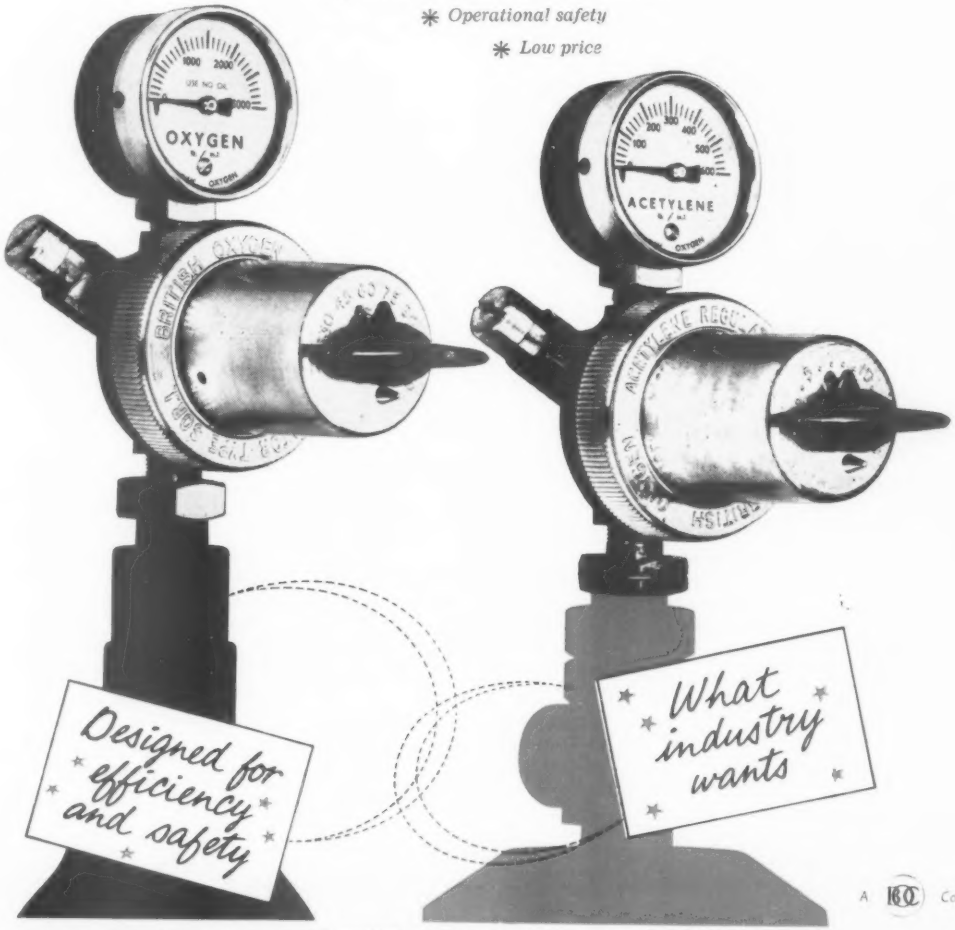

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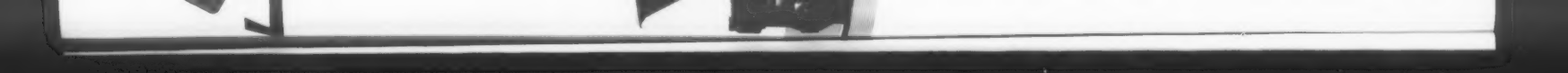

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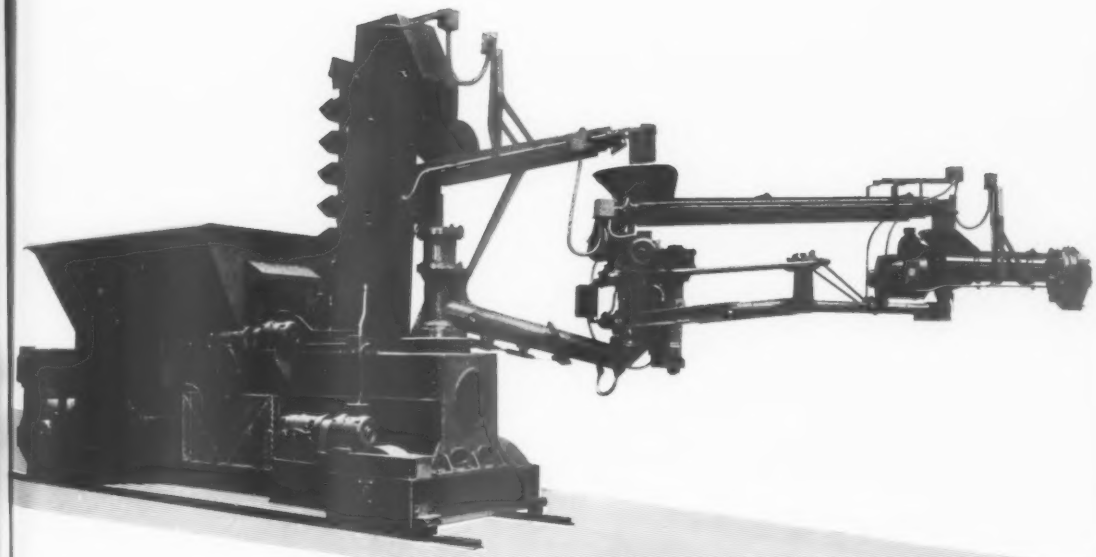

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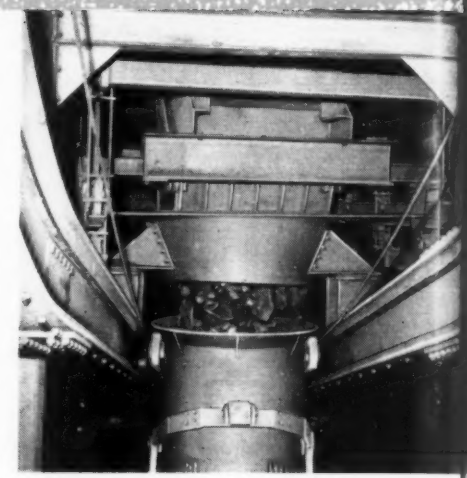
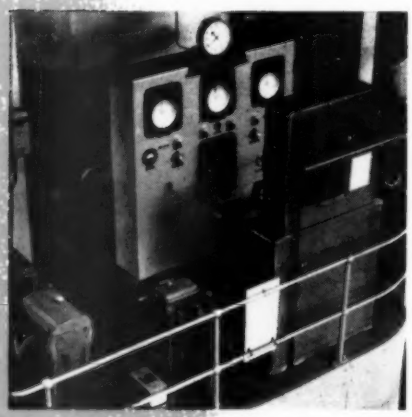


Materials from floor weigh hopper discharging into a drop bottom bucket of swivel charger serving two 12-ton-per-hour cupolas.



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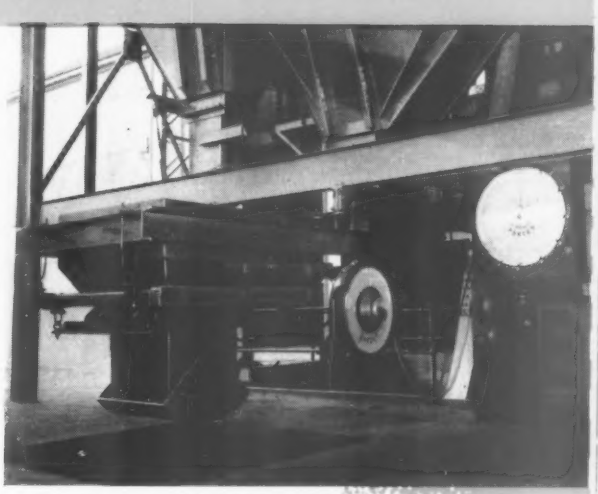

Coke and limestone weigh hopper with automatic feeders and weigher for two 20-ton-per-hour cupolas.

(*Below*) Coke hopper, floor weigh hopper and stock bins, for swivel charger serving 8-ton-per-hour cupolas.

(*Below*) 15-ton oil-fired stationary receiver for a pair of 20-ton-per-hour cupolas.

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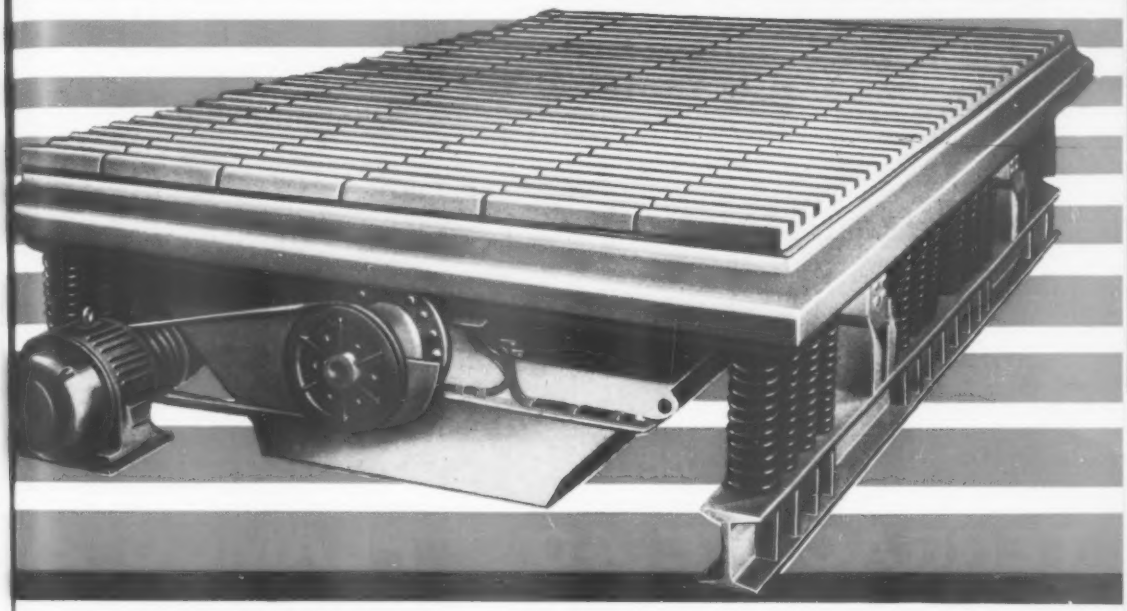

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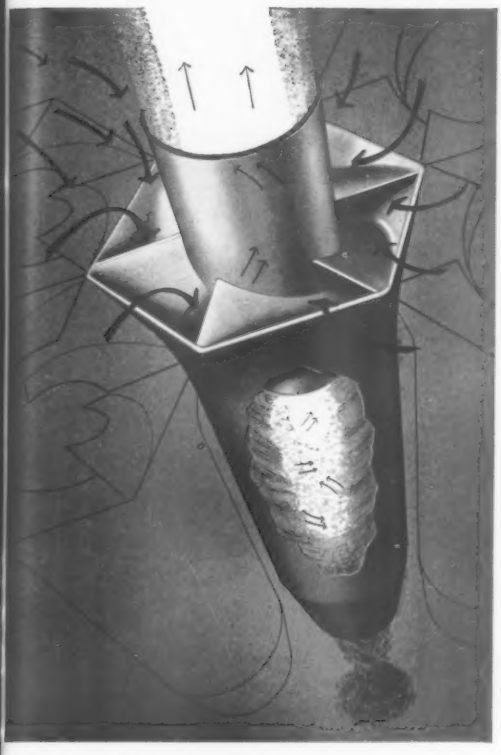

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Sturdy construction.

Factory assembly ensures dimensional precision and rigidity.

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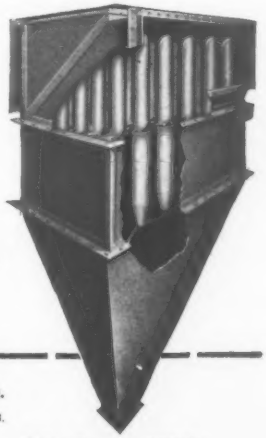

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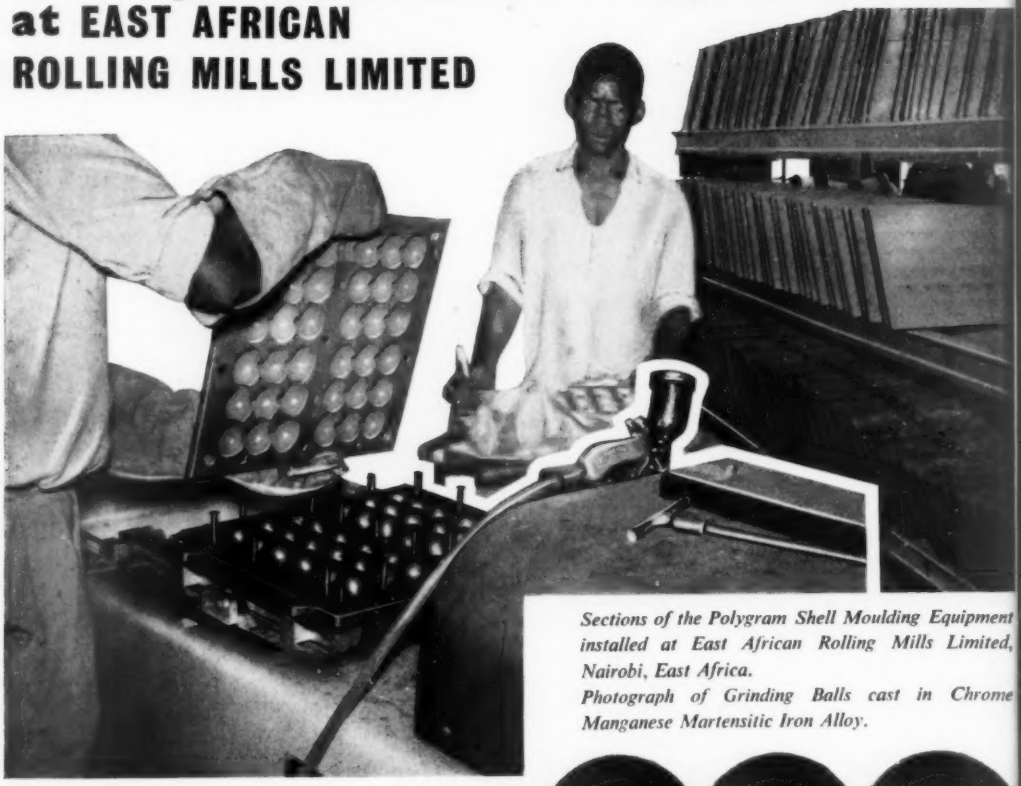

Sections of the Polygram Shell Moulding Equipment installed at East African Rolling Mills Limited, Nairobi, East Africa.
Photograph of Grinding Balls cast in Chrome Manganese Martensitic Iron Alloy.

East African Rolling Mills Limited produce large quantities of Grinding Balls for the Cement Works and Mines of East Africa. The Balls are cast in Chrome Manganese Martensitic Iron Alloy, and are vastly superior to the previously used forged steel. Production costs are considerably lower and African unskilled labour is used for the entire production.

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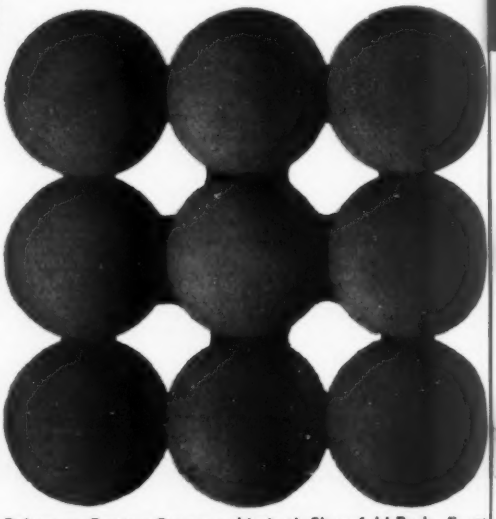
Polygram Casting Company have a competent and complete service to offer and your enquiries are invited.



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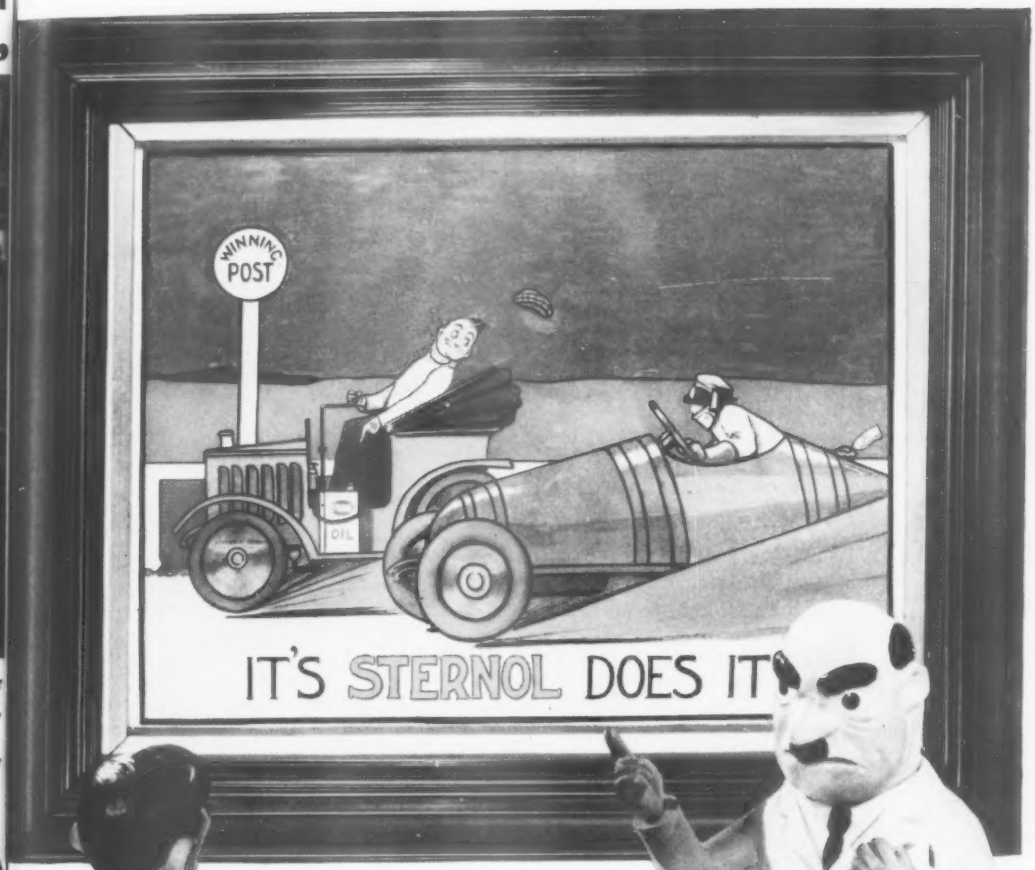

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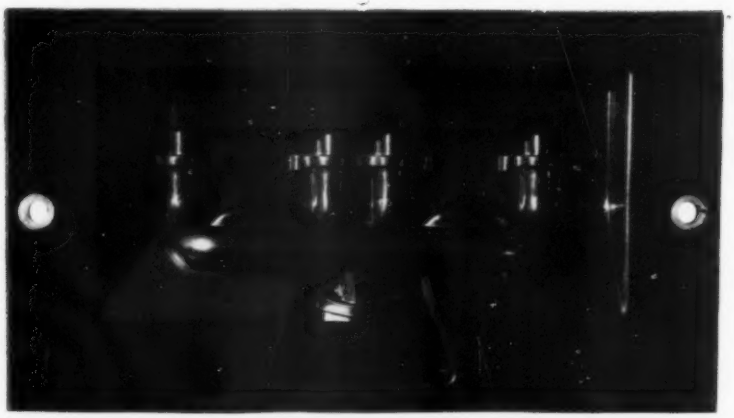
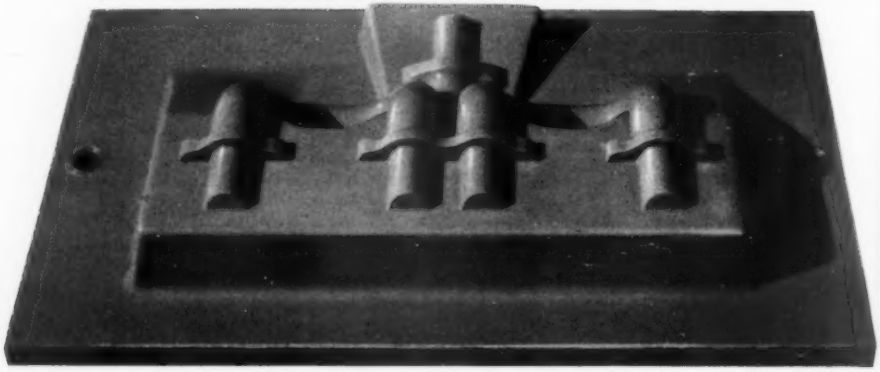
May we send you further particulars?





Foundry patterns cast in Araldite by H. J. Dowler (Engineers' Pattern Makers) Ltd., Birmingham

Araldite **epoxy resins**

Araldite is a registered trade name

CIBA (A.R.L.) LIMITED *Duxford, Cambridge. Telephone: Sawston 2121*

AD 522

MEMO from G.T.B.

Bill,
I've heard this is good — please try it.
George.
14/1/60

There is nothing like practical test

for foundry sands
BERKOAL

an interesting new material of importance.
Have you tried it yet?

STOPS EXPANSION DEFECTS
IMPROVES GREEN STRENGTH
REDUCES COAL DUST

BERK CHEMICALS

Post this for FREE TRIAL

F. W. BERK & Co. Ltd.,
Berk House, Portman Square, London, W.1.

Please send me FREE OF CHARGE .....lb. sample of BERKOAL with literature and quotation.

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Fabricated Platework to your specification

PIPE WORK

We can supply low pressure Gas and Water Mains and high pressure welded unlined water piping. We also specialise in bends of large diameter, pipes and branch pipes of complicated designs.

DUCTS

We fabricate ducts of rectangular design for power stations or boiler houses, of electrically-welded construction in Mild or Special Steels or Aluminium Alloy. They are accurately fabricated to suit your exact requirements.

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Our latest Brochure "FABRICATED PLATEWORK" fully describes our activities in this field A copy is yours on request.

W. G. ALLEN & SONS (TIPTON) LTD.

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Tel: TIPTON 1266

"NEWSTAD" Ingot Mould Stoves —chosen for the new Durgapur Steel Works

In addition to this important contract "NEWSTAD" Equipment is also used by the Brightside Foundry & Engineering Co. Ltd., in their new mould foundry at Ecclesfield. The high efficiency of "NEWSTAD" ingot mould stoves is proved by the fact that more than three of these stoves have been supplied to any one other make.

—choose "NEWSTAD" for reliable service

MODERN FURNACES and STOVES LIMITED

Builders of INDUSTRIAL FURNACES

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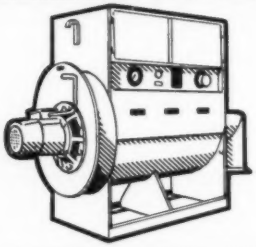
11

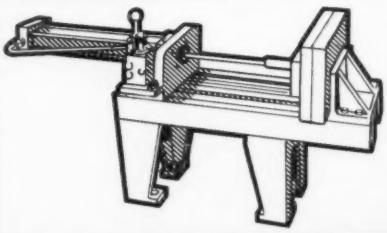
EFCO-BROWN BOVERI MOULD DRIERS

Portable electric mould driers to give quicker and more efficient drying by forcing hot air through the sand. Drying costs cut by 30%



GRAVITY DIE CASTING MACHINE

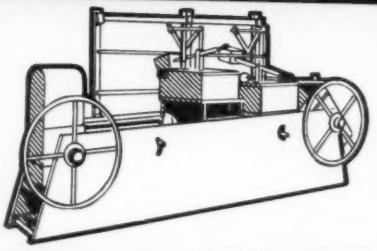
A simple machine for low cost production of castings which do not need to be made within strict dimensional tolerances. Dies cost 70%—75% less than orthodox dies.



..... Foundry Equipment

SHELL MOULDING MACHINE

A manually operated machine for making good moulds consistently in sizes up to 18 in. by 14 in. Power consumption is only 13 kW.



SHELL MOULD CLOSING MACHINE

A new-type patented press giving rapid, positive closing of shells using a thermo-setting adhesive. Closing time can be only 30 seconds with 100 moulds being closed an hour.

Enquiries invited for gas and oil fired melting furnaces, heat treatment furnaces, core blowers and all types of mould and core drying ovens.

EFCO-DIAMOND ROTARY REACTOR

A new method of desulphurising iron and steel, developed in U.S.A. by Diamond Alkali Company. The desulphurising process is efficient and easily operated, using inexpensive re-agents. Reactors can be supplied for batch and continuous production, for outputs of 5 tons or more an hour.

FOUNDRY AND METALLURGICAL EQUIPMENT CO. LTD

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Weybridge 3891

THE LOGICAL CHAIN OF EVENTS

Foundrol core oils

MORE AND MORE FOUNDRY MANAGERS
ARE TURNING TO FOUNDROL CORE OILS TO HELP
PRODUCE INTRICATE CORE ASSEMBLIES—

Group of iron castings and associated core assemblies
produced by WEST YORKSHIRE FOUNDRIES
LTD LEEDS using—

FOUNDROL C31A CORE OIL

better castings

HARMARK
FOUNDRY SUPPLIES

MANUFACTURED BY

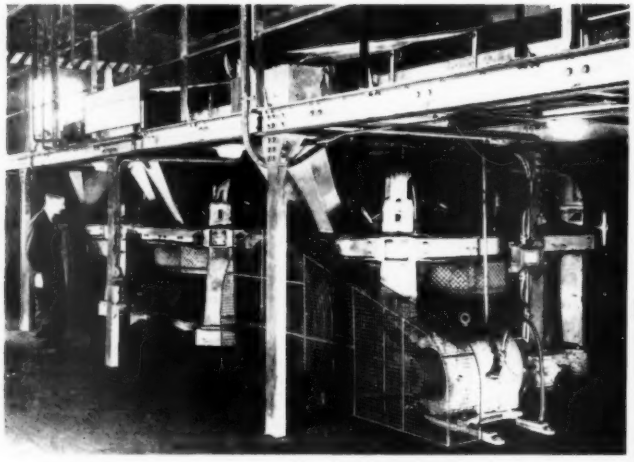
HARBOROUGH CONSTRUCTION CO·LTD·MARKET HARBOROUGH

For Increased Productivity!-

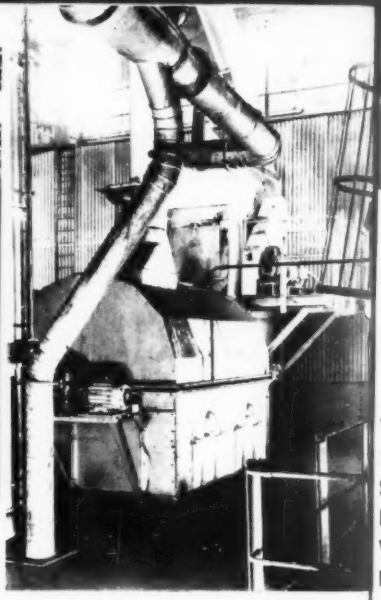
LEY'S MALLEABLE CASTINGS COMPANY LIMITED

SPECIFY FE PLANT

FOR THEIR NEW DERBY FOUNDRY



THREE S.B.3 SAND MILLS PROVIDE A CONTINUOUS SUPPLY OF MOULDING SAND (MAX. CAP. 30 T.P.H. EACH)



8'0" × 6'0" ROTARY SCREEN ENSURES "CLEAN SAND FOR MILLS

OVERSEAS COMPANIES

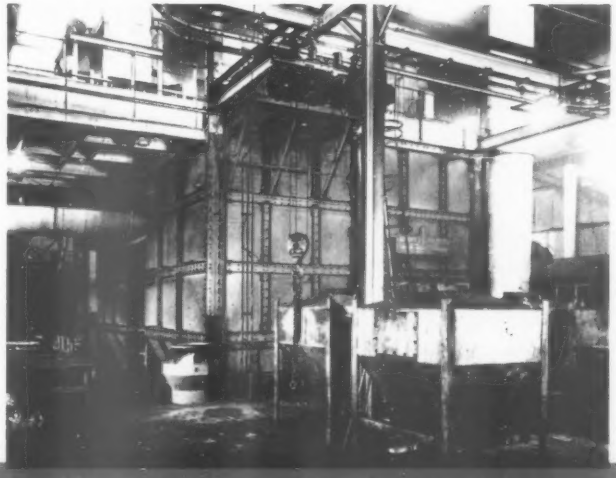
FOUNDRY EQUIPMENT (AUSTRALIA) PTY. LTD., Elizabeth, S. Australia

F. E. (NORTH AMERICA) LTD., Toronto, Canada

F. E. (SOUTH AFRICA) PTY. LTD. Johannesburg, S. Africa

"FOUNDRY EQUIPMENT" COMERCIAL ESPAÑOLA, S.A. Madrid, Spain

GENERAL VIEW OF SAND HANDLING AND DISTRIBUTION SYSTEM SHOWING TWIN OVERHEAD CONVEYORS FITTED WITH AUTOMATIC AND ELECTRONIC PLOUGH SYSTEM—ELIMINATING *"THE MAN OVERHEAD"*.



VIEW OF PART OF TWIN 125 TON CAPACITY SAND STORAGE HOPPERS EACH FITTED WITH FOUR 36" WIDE 13'3" CENTRES FEEDER BELTS FOR CONTROLLED SAND FEED TO MILLS

FOUNDRY EQUIPMENT LTD.

LEIGHTON BUZZARD, BEDFORDSHIRE, ENGLAND.

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FOR FOUNDRY EFFICIENCY

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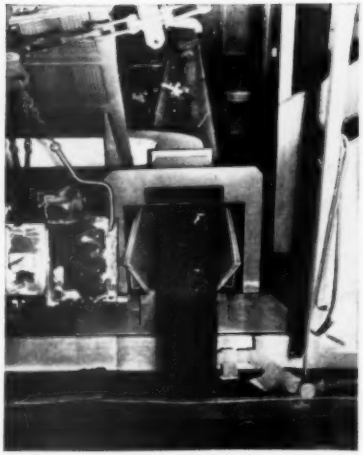
LEIGHTON BUZZARD 2441 (5 LINES)

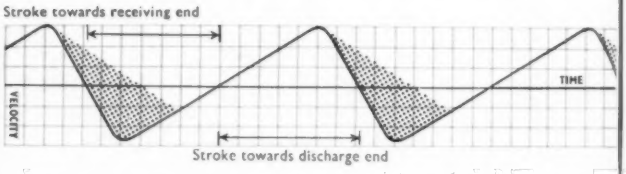
TELEGRAMS:
EQUIPMENT, LEIGHTON BUZZARD



Shaker conveyor discharging scrap on to a similar conveyor. (The photographs reproduced in this advertisement are published by courtesy of Ford Motor Company Limited.)

Sand cores and risers from engine component castings fall on to a shaker conveyor which carries them to a rotary scrap breaker and sand separator.

Shaker conveyor showing type G 20 drive, driven by a 20 h.p. flywheel motor; this robust drive delivers high peaks of energy.



SHAKER CONVEYING

in a mechanised foundry

The Distington-Goodman shaker conveyor is not a jigger conveyor. Its troughs move in only one plane on ball-bearing rollers and propel material by variations in their rates of acceleration and deceleration (these are shown in the time-velocity curve above: the shaded areas represent the movement of material independent from the movement of the troughs).

Distington-Goodman shaker conveyors have been used for many years for loading and conveying coal and rock. Their robust all-steel construction makes them ideal for handling hot materials in foundries and cement clinker and sinter.

They are easily extended and contracted and can be made self-loading from stock heaps. Lines of troughing can be made to deviate through angles up to 90°. Conveying capacity depends upon several factors but would normally exceed 60 t.p.h. on the level.

DISTINGTON ENGINEERING COMPANY LIMITED

WORKINGTON · CUMBERLAND · ENGLAND

DISTINGTON

DB.22

STEIN *Refractories*

CEMENTS, PLASTICS AND CASTABLES

From our extensive range of Refractory Cements, Plastics and Castables, covering a wide range of properties, we can supply the correct material for most industrial applications.

REFRACTORY CEMENTS

"Nettle" Refractory Cement
Heat-setting

"Stein" High Alumina Cement
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"Maksiccar 11" Refractory Cement
Air-setting

"Maksiccar" Fire Cement
Air-setting

PLASTIC REFRACTORIES

"Maksiccar Patch"
Air-setting

"Stein 73 Patch"
Air-setting

CASTABLE REFRACTORIES

"Stein Refractory Concrete"
Hydraulic-setting

"Stein Super Refractory Concrete"
Nos. 16, 17 & 18. Hydraulic-setting

"Stein Chrome Concrete"
Hydraulic-setting

Please ask for a copy of our No. 4 Pamphlet.

JOHN G. STEIN & CO. LTD. Bonnybridge, Scotland

TEL. BANKNOCK 255 (4 LINES)

Eyes Front!

. . . and whatever you do don't move. If you're in the market for non-ferrous ingots to British Standard Specifications, or special analysis, may we suggest a call to Park and Paterson before you take action. We have the experience, the equipment, the know how, few may claim to know the drill quite so well as we do . . . we are at your service.

Park and Paterson Ltd.

INGOT MANUFACTURERS

MANCHESTER
MARPLE, STOCKPORT, CHESHIRE. Telephone: MARPLE 1422-3

GLASGOW
PARKHEAD, GLASGOW, E.1. Telephone: BRIDGTON 4451-2.

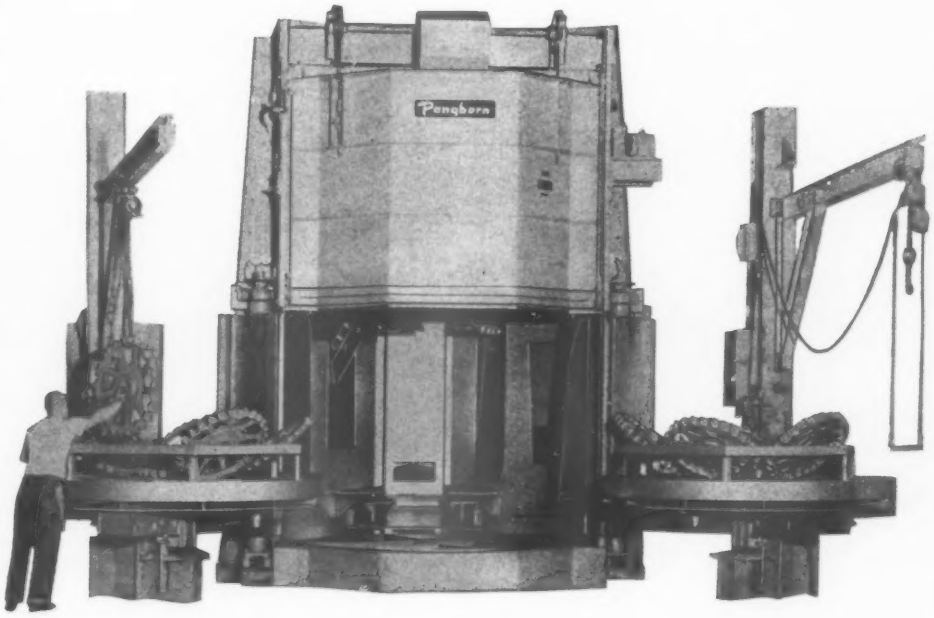


illustration of 8′ 0″ diameter
TWIN TABLE

MAXIMUM WORK

Machine	Dia.		Height		Weight
4 LM	4′ 0″	×	2′ 0″	×	2,000
6 LM	6′ 0″	×	3′ 0″	×	4,000
8 LM	8′ 0″	×	3′ 6″	×	10,000
8 LM-1	8′ 0″	×	5′ 0″	×	12,000

"Panqborn"
AIRLESS
SHOT BLASTING
MACHINE

with guaranteed 10,000 lb.
loading capacity each table

HEPBURN CONVEYOR CO. LTD.
WAKEFIELD

Roper

WET TYPE SPARK ARRESTERS

Designed by experts—the example shows the simple but scientific approach to a vital problem.

Photographs by courtesy of
BILSTON FOUNDRIES LTD.

Above:

View showing Wet type Spark Arresters with Inspection Platform serving 17-ton per hour Cupolas.

Left:

This highly efficient Spark and Dust Suppressor is provided with a Spray Jet giving double water curtain as illustrated.

E. A. ROPER & CO. LTD

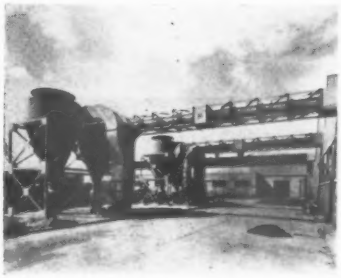
FOUNDRY EQUIPMENT ENGINEERS

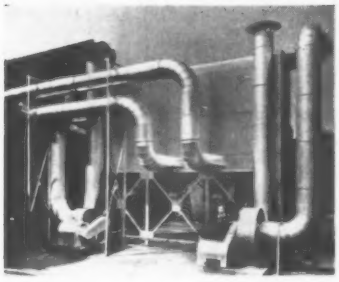
Telephone: Keighley 4215/6 **KEIGHLEY · YORKSHIRE** Telegrams: "Climax" Keighley

J.J.M.

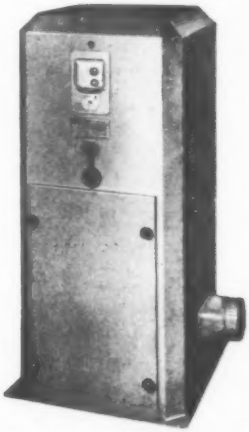
DUST AND FUME EXTRACTION

GRIFFITHS LTD FACTORY PLANT



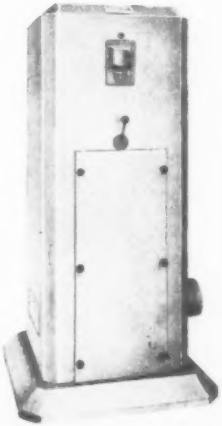


The choice of dust extraction equipment depends on a number of factors—size and nature of dust involved, the value of this dust as a by-product, the degree of exhausting and separation efficiency required. Our intensive research into the control of industrial dust enables us to offer advice on this subject for large or small installations, according to **your** requirements.



Unit type Dust Collectors to provide efficient dust extraction and separation at its source.

Wet or dry dust extraction systems for metals or woodworking operations, and for exhausting chemical fumes and moist gases we specialise in glass fibre or P.V.C. fabrications, which have a high chemical resistance quality.



Capacities of units range from 200 to 2,400 c.f.m. **There is a unit to suit your requirements.**

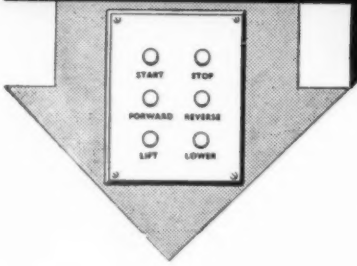
Dust Collecting, Fume Extraction and Ventilation Engineers

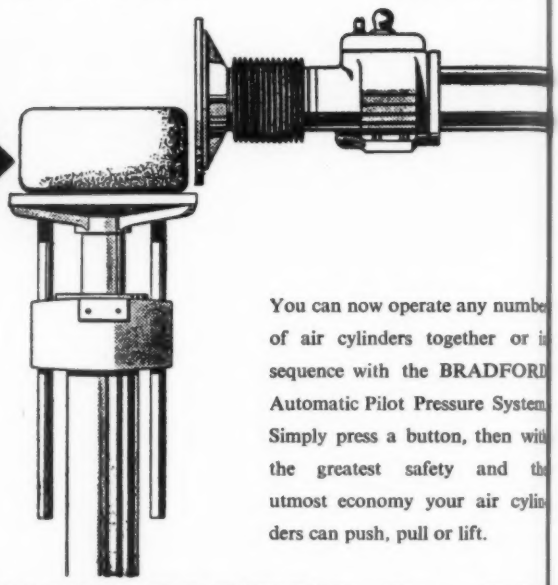
A. E. GRIFFITHS (Smethwick) **LTD.**
BOOTH STREET, BIRMINGHAM, 21
Phone: SMEthwick 1571 5. Grams: Grifoven, Smethwick

START, STOP, FORWARD, REVERSE, LIFT, LOWER,

all by remote control with

BRADFORD AIR CYLINDERS





You can now operate any numbe of air cylinders together or i sequence with the BRADFORD Automatic Pilot Pressure System Simply press a button, then wit the greatest safety and th utmost economy your air cylin ders can push, pull or lift.

Write for details

UNITED STATES METALLIC PACKING Co. Ltd

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Branch Offices: London, Liverpool, Glasgow, Manchester, Newcastle, Cardiff, Southampton, Hull, Swansea and Bristol

Cut costs of
foundry fettling with

Zircosil

ZIRCON SAND AND FLOUR

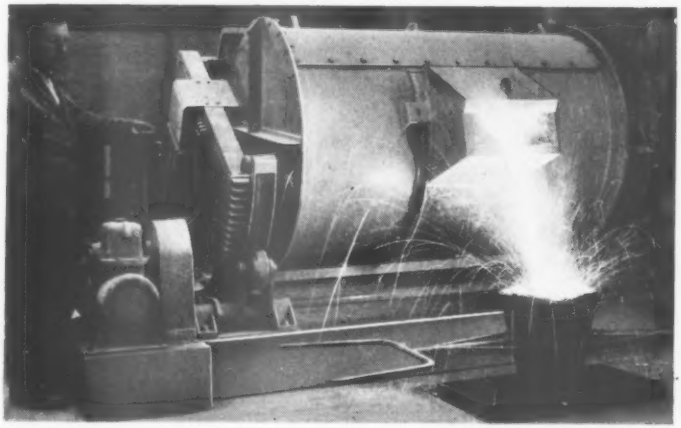
ASSOCIATED LEAD MANUFACTURERS LTD.

Zircon Division, Crescent House, Newcastle upon Tyne, 1.

METALECTRIC - CALAMARI

Mains Frequency Melting

for cast iron, S.G. irons, special irons and the reclamation of cast iron swarf, borings and turnings—



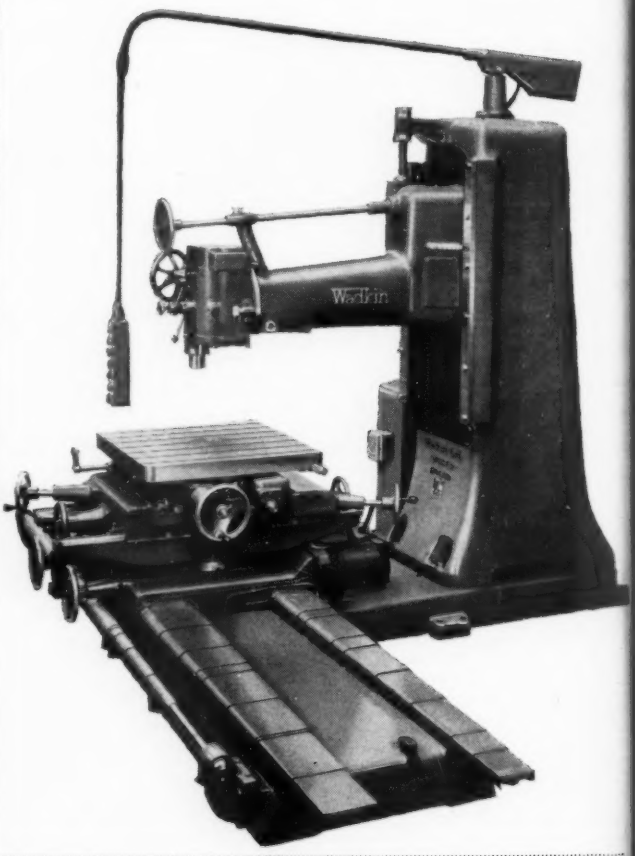
The GRK range is also suitable for holding and superheating cupola iron. Other Metalectric-Calamari models are available for the melting of non-ferrous and light alloys.

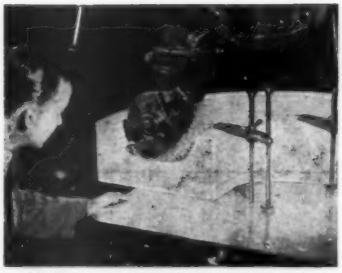
METALECTRIC FURNACES LTD.

Smethwick · England

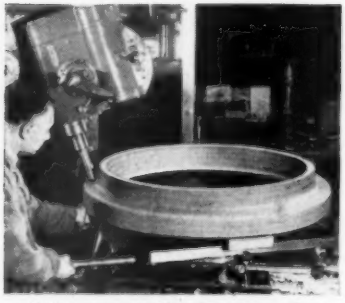
For all forms of electric heat treatment equipment 5/27A/60

Faster and more accurate pattern making with the latest Wadkin miller





Machining a pipe bend core box by means of a revoluble head. Any diameter up to 14½in. can be worked.



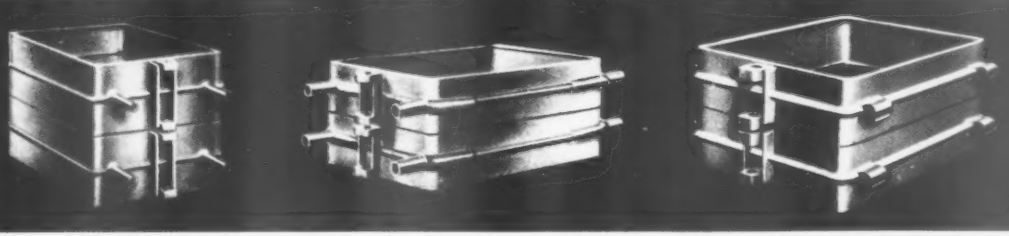
Milling the outside of a ring. Any diameter up to 10ft. can be worked.

The type WZ Pattern Miller, shown above, is fitted with a power-operated table. This table permits heavier patterns in both wood and metal to be handled due to its greater rigidity and the increased depth provided between the spindle and table. The infinitely variable feed on the table movement also permits heavier cuts to be taken faster and more accurately. A type WX Pattern Miller with hand-operated table and a Junior Pattern Miller, type W.S., are also available.

Wadkin

Wadkin Ltd., Green Lane Works, Leicester. Tel. : 68151.
London Office : 62 Brook Street, W.1. Tel. : MAYfair 7048.

a c c u r a c y



rting faces ground level and true. . . holes
g-drilled to ensure that pins and pin centres are
rfectly aligned . . . all adding up to Accuracy.

Sterling

LING FOUNDRY SPECIALTIES LTD., BEDFORD, ENGLAND

Cogent 602

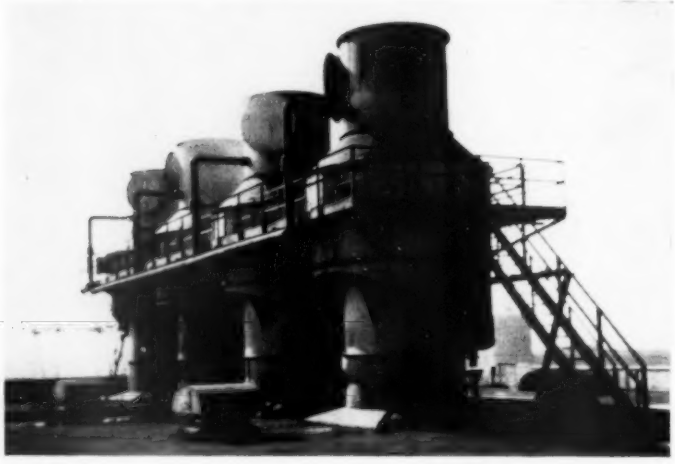
The 'CLEAN AIR ACT' demands EFFICIENT dust and grit suppression

Instal...

TITAN

WET ARRESTERS

Designed by the principal Cupola manufacturers in the U.K. with more than 40 years experience and proven practice in all aspects of Cupola operation.



Many Foundrymen think Wet Spark Arresters are a recent development and because of troubles experienced with some installations, usually caused through bad design, they tend to regard them with suspicion.

We are proud that FORD MOTOR CO. selected **TITAN** Wet Spark Arresters for the **4 TITAN** 30 ton per hour Hot Blast Cupolas which we installed in their new Thames Foundry, the most modern in Europe.

These are illustrated, the second Cupola from the left is " blowing " —note the complete absence of dark smoke, sure proof of efficiency.

Photo completely untouched taken during normal operating conditions.

CONSIDER THESE ADVANTAGES

- **Reduce Maintenance or Replacement of Gutters, Drains and Roof Sheeting.**
- **Protection of Paintwork, Roof Structures and Coatings, Glazing, etc.**
- **Eliminate Fire Hazards. It's worth approaching your Insurance Company!**
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THE CONSTRUCTIONAL ENGINEERING CO. LTD

DESIGNERS & ACTUAL BUILDERS OF EFFICIENT FOUNDRY PLANT

TELEGRAMS STRUCTURAL

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Finding the

answer to

If you should be faced with a technical problem in connection with casting defects in foundry sands, you are invited to call on the facilities of our experimental foundry and sand testing laboratory. In addition, our foundry technicians will be pleased to visit any foundryman who might wish to discuss a particular difficulty on the spot. These 'Fulbond' services are offered without charge and are, of course, entirely confidential. If you will kindly telephone or write to us, we shall be very pleased to co-operate in finding the answer to your problem.

your problem

A MEMBER OF THE LAPORTE GROUP

THE FULLERS' EARTH UNION LTD

Patteson Court, Nutfield Road, Redhill, Surrey. Telephone: Redhill 3521

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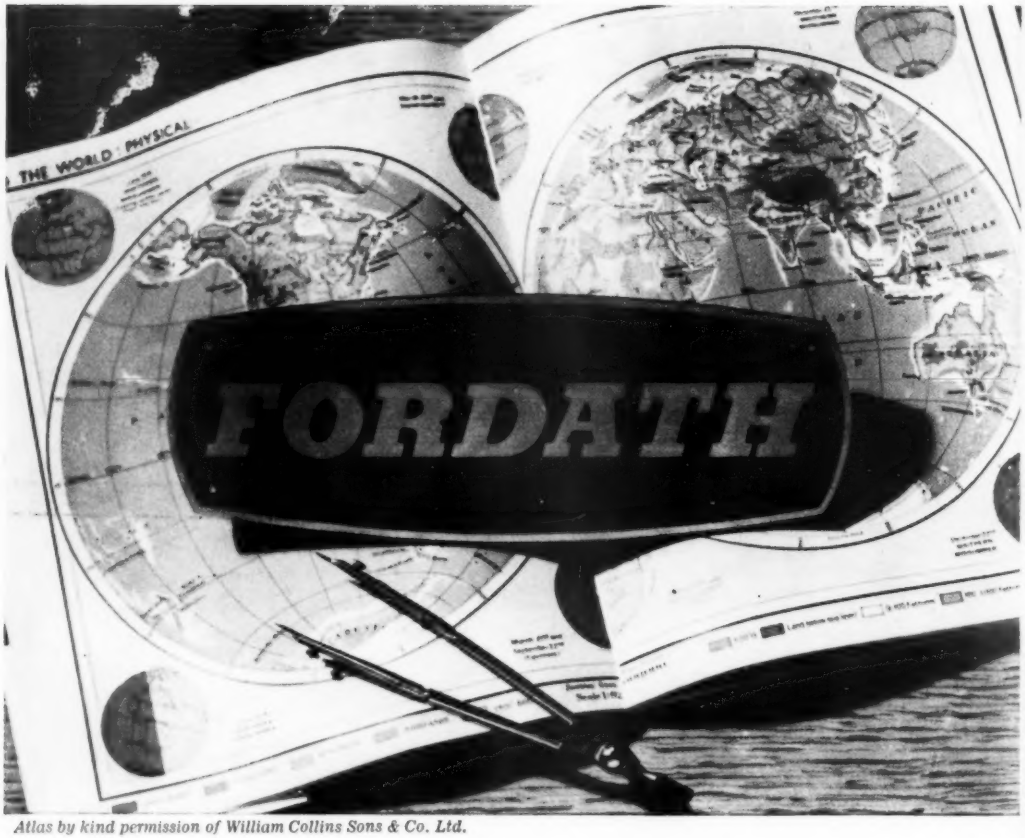

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FOUNDRY TRADE JOURNAL

Vol. 108. March 3, 1960 No. 2256

Established 1902

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Advertising Manager:
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Publisher: H. J. DWYER
Circulation Manager: E. T. GRIFFITHS

District Representatives:
G. P. ELLIOTT (Northern Area) 'phone: Altrincham 1334
T. H. SMITH (Scotland) 'phone: Dumbarton 1046
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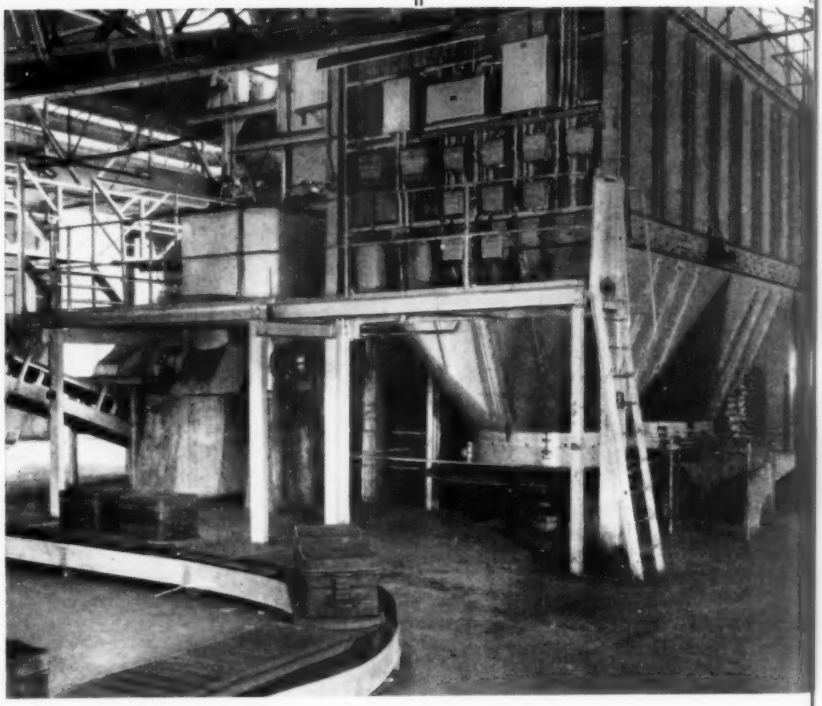
MODERN FOUNDRY EQUIPMENT

by August's LIMITED

Sand Preparation Plant

Photograph shows:
Two large storage hoppers with rotary table feeders, supplying reconditioned sand to belt conveyor; to bucket loader (with bifurcated chute) which charges two 2F size August-Simpson Mix-Mullers. Batch capacity of each Mix-Muller 2,000 lbs. Note the August Mould Conveyor in foreground.



Photograph published by courtesy of Messrs. Shotton Bros. Ltd. Malleable Ironfoundry

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FOUNDRY
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Vol. 108 March 3, 1960 No. 2256

"Steel Castings—a Good Buy"

In 1953, the British Steel Founders' Association took the risk of asking their customers in an open meeting to tell them frankly what they thought of their products. The adverse criticisms received must have been salutary as, at a similar Customer/Steelfounder Conference held last week at Earls Court, London, the whole atmosphere was changed. While most of the new comments made were appreciative of the good service given and the progress in quality of production achieved, there were also some good suggestions made by the users. For instance, in the rectification of minor surface-defects, especially in the case of some of the alloy steels, it was held that to ensure real satisfaction more care should be given to the selection of the material to be deposited. Other queries were raised as to research prospects; here it was pointed out that the steelfoundry industry is a small one with an annual turnover of about £40-45 million per year, yet it was spending something of the order of half-a-million pounds on research. The British Steel Castings Research Association, now with a staff of 75, would spend £100,000 next year it was stated, and few industries could show such a progressive policy.

Questions were also raised about the cost of X- and gamma-ray testing, no doubt because of excessive and unrealistic demands for such services. Mr. C. H. Kain, we thought, rather surprised the customers when he detailed the costs involved, which occupied a five- to seven-minutes' lecture. It was made quite clear by Dr. Dadswell, the chairman of the conference, that steelfounders need the co-operation of the customer in design and inspection, but the intermediate manufacturing processes could safely be left to the founder. According to a recent statement in the Press, the designer of fabricated structures must familiarize himself with all the various welding processes. It was thought by some present that weldments were slightly cheaper than steel castings, but this was queried by the steelfounders, who believed that such a misconception arose often through the neglect to cost properly. Some of the items involved in weldments—such as the making of jigs and fixtures, the cost of heat-treatment and rent of floor-space occupied—were apparently forgotten.

On a co-operative stand in the Earls Court exhibition (as well as on a number of individual stands), members of the British Steel Founders' Association proudly displayed their current productions. These gave substance to the conference discussions and left in the minds of the 200 or so customers who attended the meetings a clear conception that it was a progressive industry, which would make every effort to ensure that steel castings were indeed a "good buy," as the stand's banner blatantly proclaimed.

Engineering Materials and Design Exhibition

Held at Earls Court, London, last week, the Engineering Materials and Design Exhibition,* the first ever organized, attracted a large attendance from a very wide cross-section of this country's engineering industry. Thus, the firms with direct foundry interests who were exhibiting—and such firms occupied about half the Exhibition space—must have been well pleased with the result. Some of them in fact were so enthusiastic that they reported they were already making enquiries about stand space at the next exhibition of this type which is expected in about two years' time. As more than one foundry executive manning the stands put it, "It was the first time at an exhibition that prospective clients have brought blue-prints to our stand for discussions with our technical personnel, as a preliminary to our quoting for castings."

It was a pity that the advance publicity for this Exhibition emanating from the organizers and exhibitors alike was somewhat meagre, for it was not until the Exhibition catalogue was issued that the substantial nature of participation by the foundry industry and its ancillaries could be gauged. An exception to this criticism was the excellent joint exhibit by the British Steel Founders' Association, which was among those reviewed in the February 18 issue of this JOURNAL.

This stand, under the slogan of "Steel Castings—a Good Buy," really was a most enlightened piece of publicity for propagating new uses for steel castings, showing that the steelfoundry industry at least is very much alive to the need to seek fresh fields. Apart from steelfounders represented on the BSFA joint stand, quite a number had their own individual exhibits and some showed castings in other metals, too. Amongst them were A.P.V.-Paramount, Limited; Lake & Elliot, Limited; Lloyds (Burton), Limited; National Steel Foundry (1914), Limited; Firth-Vickers Stainless Steels, Limited; Sheepbridge Alloy Castings, Limited; Samuel Osborn & Company, Limited, and Vickers, Limited. The last company also showed both alloy-iron and copper-base castings.

Individually, a number of well-known ironfounders were also showing; these included Ferranti, Limited; John Harper & Company, Limited; S. Russell & Sons, Limited; Sheepbridge Stokes, Limited; Henry Wallwork & Company, Limited, and John Williams of Cardiff, Limited. Some engineering firms having foundry interests, such as Ruston & Hornsby, Limited, also had stands, though not all included castings as part of their exhibits.

Amongst the metal-producing trades, communal stands at the exhibition were manned also by representatives of the Zinc Alloy Die Casters Association, the Magnesium Industry Council and the International Meehanite Metal Company, Limited, and there were also a number of stands of firms on the fringe of the foundry industry or who act as suppliers to it. Amongst the latter one might mention Henry Wiggin & Company, Limited; Midland Silicones, Limited; the Distillers Plastics Group, and Imperial Chemical Industries, Limited.

This country's non-ferrous industry was represented by the stands of Dewrance & Company, Limited; Johnson, Matthey & Company, Limited; Langley Alloys, Limited; Manganese Bronze & Brass Company, Limited, and J. V. Murcott & Sons, Limited (diecastings). (Sheepbridge Alloy Castings, Limited, also showed non-ferrous castings). Precision castings were shown particularly by P. I. Castings (Altrincham), Limited, the firm's applications of this method not being confined to ferrous materials. The patternmaking industry was represented by at least one firm—J. J. Harvey & Pressurecast, Limited. The Morgan Crucible Company, Limited, rather surprisingly were not showing crucibles; instead, furnace-heating elements and carbon for engineering applications were featured.

In addition to the Conference organized by the British Steel Founders' Association, referred to elsewhere in this issue, a number of other conferences were held on quite a wide range of topics. Speakers well known in the foundry industry amongst those who lectured were: Mr. H. C. Child (of Jessop-Saville, Limited), Mr. P. A. Fisher (Magnesium Elektron, Limited), Mr. J. I. Morley (Firth-Vickers Stainless Steels, Limited), Dr. L. Harrison (Sheepbridge Engineering, Limited), Mr. I. L. Gwynn (P. I. Castings (Altrincham), Limited), Mr. H. Morrogh (director, British Cast Iron Research Association), Mr. R. K. Whitehead (English Electric Company, Limited), and Mr. R. M. Kay (Associated Electrical Industries, Limited). The list of chairmen included Mr. W. C. F. Hessenberg (deputy director, British Iron and Steel Research Association).

It might be thought from the quoting of so many prominent firms and individuals that this was a large exhibition, but in fact a second exhibition was also being run concurrently in the Earls Court premises which themselves are not over-large. The net result was that visiting foundrymen and engineers discovered that much was crammed into small compass, the technical value was high, and traversing the exhibition from end to end was "easy on the feet."

* Organized by Industrial and Trade Fairs, Limited, Russell Street, London, W.C.2.

Forthcoming Events

MARCH 5

Liverpool Metallurgical Society

Seventh annual conversazione to be held at the University Club.

MARCH 7

Institute of British Foundrymen

Sheffield branch: "Bond Clays: Recent Work and Ideas," by A. L. Roberts, 7 p.m., at the Sheffield College of Commerce and Technology, Pond Street.

Lancashire branch: Meeting at 7 p.m., at the Midland Hotel, Manchester. (Details of change in programme may be obtained from the branch secretary.)

MARCH 8

Institute of Vitreous Enamellers

Scottish section: Works visit to Burroughs Adding Machines, Limited.

Institute of British Foundrymen

Coventry and district section: "Some Recent Developments at F. H. Lloyd & Company, Limited," by F. Clymer, 7.30 p.m., at the Coventry Technical College, Room A5.

MARCH 9

Institute of British Foundrymen

West Riding of Yorkshire branch: Meeting, 7.30 p.m., at the Bradford Institute of Technology. (Details of change in programme may be obtained from the branch secretary.)

MARCH 10

Institution of Production Engineers

Leicester section: "Developments in Dimensional Accuracy," by K. J. Hume, 7.15 p.m., in the Cromwell Room, Grand Hotel, Leicester.

Institute of Fuel

Midland section: "The Work of the British Coal Utilization Research Association," by Dr. T. A. Townend, 6.30 p.m., at the Birmingham Exchange and Engineering Centre, Stephenson Place.

Institute of British Foundrymen

Birmingham branch: Works visit to Ford Motor Company's Imperial Foundry at Leamington with a guest party from the London branch.

SECTION DEVOTED TO THE TECHNOLOGY OF PRODUCING DIMENSIONALLY-ACCURATE CASTINGS

Composite Shaw-Process Moulds

Production of Cast Dies at the Works of the Wolverhampton Die Casting Company, Limited*

By G. P. Welch

The theme of this article poses a lesson worth learning by all branches of the foundry industry. This is that in adopting a precision-casting method for the manufacture of die-casting dies (instead of "hacking" them from the solid), the firm in question—Wolverhampton Die Casting Company, Limited—increased their efficiency, and hence lowered the costs of their own production of high-accuracy castings. Investment founders and die-casters are often competitive, and it says much for to-day's enlightened outlook that such a give-and-take attitude in their process developments is possible.

Until January, 1959, most of the work carried out using the Shaw Process at the Author's works had been directed towards producing impressions for pressure-die-casting—the largest casting made by the Wolverhampton Die Casting Company, Limited having a total cast weight of 150 lb. The main application of the process to die-making was in the construction of dies for the motor industry, where speed of manufacture was the most critical factor. Not only were the reduction in time and cost in producing the die significant features, but also important was the fact that the firm's overall die-making capacity was increased, with an attendant beneficial effect upon the delivery of pressure-die-castings to the customer.

Bolster Problem

Having produced the impressions in a shorter time, the problem facing the firm was to mount them in bolsters for use on the die-casting machines. Here, a delay was caused, as the bolsters were machined from solid blocks of cast steel, in the manner that had always been used at Wolverhampton. In good die-casting practice, differences in level or section on the impression inserts are reproduced in the bolsters, and, of course, run out in most cases to the edges of same. The work required to machine sections in places where height differences of about 4 in. or more are concerned can very often run into hundreds of hours, thus causing high labour-charges. Additionally, there are heavy weights of steel to machine away in the form of swarf, which has little value. An example of such wastage is when the firm have purchased, say, two blocks of steel weighing 15 cwt. each, and the finished weights have been 8 and 10 cwt. respectively.

Preliminary Trials

In consequence, it was hardly surprising that the firm's thoughts had been directed to casting bolsters for some little time, although no real attempts were made until 1958. The use of spheroidal-graphite iron is a feature of some European die-casters' production methods, who appear to have appreciated the saving in cost that can be achieved somewhat earlier than British die-casters. At Wolverhampton, the firm's first efforts were made using sand moulds and s.-g. iron in the ferritic condition, but great difficulty was experienced in trying to achieve fine-quality surfaces that were sufficiently flat to enable them to be bedded with the minimum effort. Furthermore, when using sand as the moulding material, it was necessary to use s.-g. iron and not steel, in order to get the best possible surface. One or two sets of bolsters were produced in this way and have given quite satisfactory service.

Moulds from Sillimanite

In January of 1959, the firm commenced making moulds to cast two bolsters in steel, to weigh about 300 lb. each with main dimensions 13 by 16 by 3 in. A simple wooden pattern was used and all the moulds, including casting heads, were made from Sillimanite. Fig. 1 shows the manner in which the pattern was constructed in order that it might be removed from the mould without causing distortion. There were four main pieces fitting into the corner positions as determined by the cross-members. These cross-members tapered towards the mould face. A ¼-in. layer of fused-alumina investment solution was poured over the varnished pattern, and before gelling, was backed up with Sillimanite and grog and allowed to gell completely. The pattern and mould were then turned over and the backboard and cross-members removed in one operation. The remaining four pieces of the mould were then removed separately. Constructing patterns in this way, which allows piece-by-piece removal, prevents stressing of the mould (with the attendant risk of cracking when the mould material is in the rigid state). Flat backplates in Sillimanite were prepared and luted

* Paper presented in London at the 1959 Conference of Shaw-Process licensees. The Author is chief research engineer of the Wolverhampton Company.

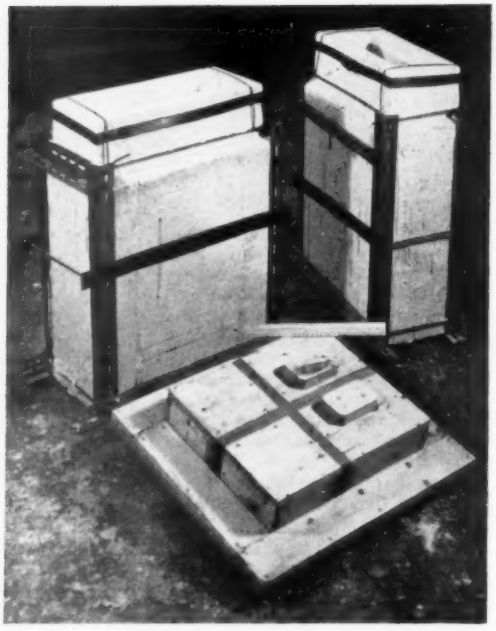


FIG. 1.—*Bolster pattern (foreground), showing the method of construction to permit removal from the mould without causing distortion. In the background are two bolster moulds braced with slotted angle-iron and wire, ready for transport to the steel foundry in Sheffield.*

to the opposite mould-half; subsequently the pouring head was attached in the same way. After firing at 850 deg. C., both moulds were braced with slotted angle-iron and strong wire (as shown in the background in Fig. 1).

Moulds transported 80 miles!

Upon cooling, the moulds were transported 80 miles to a steelfoundry in Sheffield without mishap. This was considered by the firm as a most successful operation, since they had been informed by other foundrymen that it just "wasn't done." The moulds were heated internally for a short period with a gas torch, and then 0.80-per cent. carbon steel was teemed into each through a $\frac{3}{4}$-in. nozzle. The castings were annealed, returned to Wolverhampton, and put into use. It will be seen from Fig. 1 that the bolsters were of a simple design, with a flat parting line. They were chosen for this very simplicity, as the firm was not certain that the moulds would contain the steel without bursting, particularly as the walls of the moulds were only $2\frac{1}{2}$ in. thick. The realization that this operation had been successful was indeed gratifying, but the total cost of Sillimanite, fused alumina and investment solution was considered to be too high for general use, especially since quite a small pair of bolsters had been chosen as the prototype.

New Backing Material

At this time, representatives of the Wolverhampton Die Casting Company were invited by Mr. Clifford Shaw to M.A.R.L.Y.D. in Paris. This firm were using chamotte backing-material for small moulds, in conjunction with CO_2-binders. A combination of coarse and fine chamottes and CO_2-binder gave a backing material that was immensely strong when fired at high temperatures, and was also very permeable to air. After collecting most of the details concerning the mixing of chamottes, the representatives from Wolverhampton returned to their own foundry and prepared to produce the complete one-piece die shown in Fig. 2.

Patternmaking

From the firm's point of view, this was indeed an ambitious undertaking, as it involved casting a sectional pair of bolsters with the impressions formed integrally. It was decided to base initial development on preparing dies to produce—at one cast—a pair of door-handles.

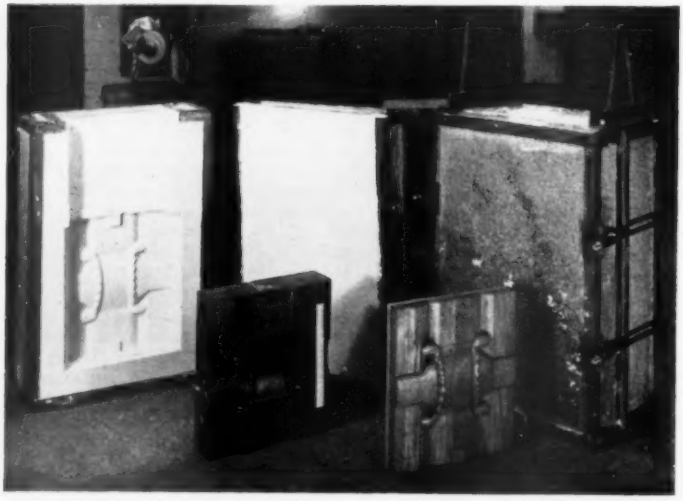


FIG. 2.—*Various stages in the production of the die bolster, showing: (left foreground) Mahogany die-pattern with mahogany handle-patterns in position; (right foreground) complete one-piece die; (left background) opened moulds, and (right background) mould assembled complete with lifting staples.*

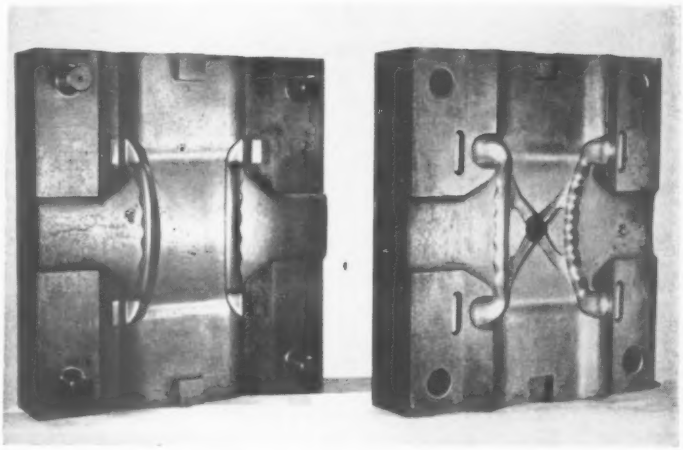


FIG. 3.—*Matching die halves fitted with dowels, shown before the addition of ejectors.*

First, a pair of mahogany patterns for the handles were made with steel contraction-allowance added, and these were adapted to suit the sections on the mahogany pattern of the moving half-die. The complete pattern was then polished and coated with polyvinyl alcohol. A thixotropic coating of epoxy resin, filled with slate dust, was next applied to the pattern, to ensure accurate reproduction of detail. Successive coatings of normal resin filled with slate were applied with a glass cloth to a thickness of about $\frac{1}{8}$ in. The back of the epoxy pattern was, of course, hollow, and after it had set and was parted from the wooden pattern, the sides were braced with pieces of wood, fixed in position with more resin. After hardening off, which took about 24 hours, the wooden handles were inserted into the resin pattern (fixed die-half) and the whole surface coated with polyvinyl alcohol. Another resin pattern was produced from this assembly in the same way as the first, the second one being the pattern for the moving die-half.

Moulding

At this stage, the patternmaking was complete, and angle-iron frames were constructed to retain the chamotte. The size of the frame was such that the feeder-head of the casting was included as part of the mould (see Fig. 2). Also, a frame was made to form the backplate of the mould. A simple wooden box was built with dimensions 3 in. per side larger than the pattern, and $1\frac{1}{2}$ in. on the depth. To this was attached the former for the feeder-head. Chamotte was rammed around the box, placed inside the moulding frame, and then gassed with carbon-dioxide. The box was then removed, leaving a cavity larger than the pattern by $1\frac{1}{2}$ in. on every dimension. The chamotte cases, front and back, were then fired at 650 deg. C. in order to harden them. After cooling, the backplate was coated with Sillimanite and the resin pattern re-inserted into the mould cavity. Prior to this, a 2-in. dia. hole was bored through the back of the mould. With the pattern in position, the mould-half was placed, parting line downwards, on to a greased board. Sillimanite slurry was poured through the 2-in. dia. hole until the space between the pattern and chamotte was completely filled. Very little accelerator had been added to the investment liquid, so that gelling would be greatly retarded. When the Sillimanite had completely gelled, the pattern was withdrawn and the mould halves were fired at 850 deg. C.

The joint-line was painted with refractory adhesive and then the mould halves were clamped together. Again, after transportation to Sheffield, 0.80-per cent. carbon steel was teemed into the moulds through a 1-in. dia. nozzle. Back at Wolverhampton, the cast die-halves were annealed and the risers removed. Fig. 3 shows the dies before fitting the necessary ejectors, and the welding of small slag cavities that happened to coincide with an overflow well. The impression surfaces were polished, and here again it was found necessary to fill certain very small cavities with mild-steel weld-metal.

Conclusion

Briefly summarizing the construction of the die, it is true to say that, from a dimensional viewpoint, the project was satisfactory, and that surface imperfections on the impression caused the greatest difficulty. Apart from two or three slag inclusions that fortunately occurred away from the impressions, the main imperfections were small surface cavities caused by volatiles remaining in Sillimanite. In future, two separate high-temperature firing periods will be used to prevent this effect.

GIFTS TOTALLING £150,000 were distributed among the 1,600 employees of Thermotank, Limited, air-conditioning engineers, etc., of Glasgow, to mark the change-over of the firm from a private family concern to a public company following the merger with J. & E. Hall, Limited, last June. Each gift was accompanied by a personal note from the chairman, Mr. Iain M. Stewart.

"SHEFFIELD, ENGLAND," a new edition of the city's official handbook, has won high praise for the quality of its production. It contains a number of articles, much interesting information, and is illustrated by both colour and black-and-white pictures. Copies, 6s. each, may be obtained from the Civic Information Service, Central Library, Sheffield 1. Cheques and postal orders should be made payable to "Sheffield City Libraries."

American Letter

Pressure Tightness of 85/5/5/5 Bronze*

The author's object was to determine the principal variables responsible for control of pressure tightness in 85/5/5/5 bronze. Procedures were developed so that other copper-base alloys also could be evaluated in a similar fashion. Melting was conducted in a gas-fired crucible furnace under oxidizing conditions. The test casting used was a standard 12- by 2- by 2-in. bar with a 4-in. dia. feeder, the feeder size, bar thickness and length being varied. Pressure tightness was evaluated from a 2- by 12- by $\frac{1}{32}$-in. specimen cut horizontally from the centre of this test casting, thermocouples being inserted in the mould to determine thermal gradients.

Results

Previous work had indicated that 12- by 2- by 2-in. bars were not sound even when wedge chills were employed, so the authors made shorter bars to determine the limiting conditions for soundness. It was discovered that, in sound 6- and 9-in. bars, the minimum thermal gradient was 30 deg. C. per in.; in 12-in. bars, wherever the gradient was less than 30 deg. C. per in., leakage occurred. A 12-in. bar poured at 1,240 deg. C. exhibited severe leakage, and it was assumed that the greater reaction rate, and longer reaction time between metal and mould, had led to a higher gas content. This indicated that a good mould design may be nullified by excessive pouring temperatures. A comparison of −44 per cent. and +37 per cent. in the feeder size of 12-in. bars resulted in sounder material from the large feeder. This large feeder was, however, no improvement on the standard feeder as regards soundness, and the leakage was similar in all three cases at points farther than 3 in. from the feeder itself.

The authors are proceeding with further work on insulated feeders. They conclude from the present work that it is possible to make pressure-tight bars 2 by 2 by 9 in. and shorter by using proper chilling techniques, and that this range can probably be extended by modification of the design of tapered chills.

Wisconsin Regional Foundry Conference

Grey-iron, steel, malleable and pattern sectional meetings were held daily at the Wisconsin Regional Foundry Conference, held at the Hotel Schroeder, Milwaukee, from February 11 to 12. The programme included the following papers: "High-strength Moulding-sands for the Jobbing Shop," by V. M. Rowell (Archer-Daniels-Midland Company); "Shell Coresand," by F. Less (Hooker Chemical Corporation); Problems of Aluminium Permanent-moulding," by M. Rostad (Rostad Aluminium Company), E. Troy (Est Company), and W. Eckert (Metamold Corporation); "New Applications in Plastic Patternmaking," by W. Weaver (Modern Pattern & Plastics Company); "Heat-treatment of Grey- and Ductile Iron," by P. H. Dirom, Jr. (Lynchburg Foundry Company); "Natural Gas Cutting," by G. Hibbard (Milwaukee Gas Light Company); "Moulding-sand Clay Content," by J. Schumacher (Hill & Griffith Company); "Aluminium Risering, Feeding, Degassing and Grain-refinement," by M. Bock (Exomet Corporation); "The Hows and Whys of Alloys for Patterns," by O. J. Seeds (Cerro de Pasco Sales Corporation); "Quality Control in the Manufacturing of Grey-iron and Ductile-iron Castings," by T. Curry (Lynchburg Foundry Company); "Dow 230 Process," by a representative of Dow Chemical Company; "Introduction and Administration of Standards," by R. Wills (Stevenson, Jordenson and Harrison Company); "CO_2 Practice," by W. R. Oakley (Delhi Foundry Sand Company, Cincinnati); "Electroforming for Pattern Construction and Repair," by P. Ritzenthaler (Plating Engineering Company); "The Gas-fired Cupola," by Carl R. Loper, Jr. (University of Wisconsin); "Gating and Risering," by R. A. Flinn (University of Michigan); "Shell Technique" by R. A. Jacobs (Lehigh, Incorporated); "Copper-base Foundry Problems," by R. A. Colton (American Smelting and Refining Company), and "Patterns by the Shaw Process," by Richard Christenson (Cast Masters).

Rise in Zinc and Copper-base Castings Production

Recently published statistics on the copper- and zinc-castings industries in the USA indicate that the 1959 production of copper-base castings was about 20 per cent. greater than that of 1958—zinc castings, which are mostly die-cast, increased about 10 per cent. (see following Tables):

Copper-base Castings Production.
(× 1,000 *Tons.*)

	Total.	Sand-moulded.	Permanent-moulded.
1956	310.0	—	—
1957	390.5	352.0	20.08
1958	340.5	311.0	14.29
1959	398.0	374.0	24.55

Brass and Bronze Ingot Sales.
(× 1,000 *Tons.*)

1956	245.0
1957	221.5
1958	203.0
1959	245.5

Zinc-base Castings Production.
(× 1,000 *Tons.*)

1956	310.0
1957	299.0
1958	263.5
1959	266.0

South-Eastern Regional Foundry Conference

The American Foundrymen's Society's south-eastern region foundry conference, sponsored by the AFS Birmingham and Tennessee chapters and the University of Alabama student chapter, was held this year at the Thomas Jefferson Hotel, Birmingham, Alabama, from February 18 to 19. The programme included the following papers: "Charging Materials for Cupola Melting," by R. A. Clark (Union Carbide Corporation, Cleveland); "S.-g. Iron Production and Control," by H. E. Henderson (Lynchburg Foundry Company, Va.); "Epoxy Resin Patterns," by M. K. Young (US Gypsum Company, Chicago); "Modern Foundry Refractories," by J. H. Rickey (Ironton Firebrick Company, Ohio); "Pouring Effect on Scrap," by C. E. Drury (GMC, Saginaw, Mich.); "Shell Moulding," by C. Schopp (Link-Belt Company, Indianapolis); "Safety, Hygiene and Air-Pollution," by J. B. Skinner (American Mutual Insurance Company), and "Steel Castings in Competition with other Materials," by C. B. Jenni (General Steel Castings Corporation, Eddystone, Pa.).

AFS select BCIRA Director as 1962 Hoyt Lecturer

Mr. H. Morrogh, director, British Cast Iron Research Association, has been chosen as the Charles Edgar Hoyt Memorial Lecturer at the American Foundrymen's Society's 1962 Castings Congress. Mr. Morrogh, who joined BCIRA in 1933, was awarded the Carnegie Gold Medal of the British Iron and Steel Institute, and in 1952 received the AFS W. H. McFadden Gold Medal . . . "For outstanding work and development in the field of spheroidal cast-iron."

* Synopsis of work done by R. A. Flinn, professor, and C. R. Mielke, special student, of the department of chemical and metallurgical engineering, University of Michigan, Ann Arbor.

Pattern and Corebox Alterations

By "Checker"

Patternmakers are frequently called upon to alter patterns and coreboxes, either to give additional thickness where thin sections of metal are revealed from proof castings, or make modifications after pattern equipment has been completed. The following article explains and illustrates some practical hints on such work.

Many different materials may be used to make pattern or corebox alterations. On wood patterns and coreboxes, the shape or size is often altered by the addition of a strip of wood, or a wood patch, a flat surface or suitable recess being cut to receive it if necessary. Sometimes a metal section is undersize at a particular spot—this can be increased by the addition of a metal patch of suitable thickness to the appropriate part of the pattern. Aluminium or brass sheets or strips are available in many thicknesses, and from these the shapes desired can be cut. In most instances, however, aluminium will be found more satisfactory, for, being a softer metal than brass, it is easier to bend and work to shape.

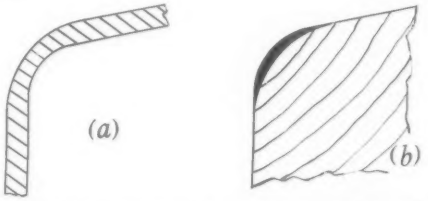


FIG. 1.—*(a) Section of a casting which is too thin at the bend, and (b) the corresponding part of the pattern after a metal patch has been added.*

Metal Patches

Fig. 1 (*a*) shows a casting section which is too thin at the corner—(*b*) illustrates the relevant section of the pattern after a metal patch has been added to the corner. As can be seen, the metal piece has been bent to shape and the edges filed to a feather edge, to conform with the pattern shape. When a metal patch is cut to shape, it is usually an advantage to shape the outsides as near as possible to feather edges before fixing it in position. These metal patches are generally fixed on by nails at the thin outer edges, while screws are used on the thicker parts. To obtain a better finish, these feather edges can often be avoided by cutting back the wood round the perimeter of the patch, so that it fits into the pattern, as in Fig. 2, where (*a*) gives the original shape, the extra metal required being shown cross-hatched. The dotted lines illustrate the part which must be cut away to avoid a feather edge being formed. Fig. 2 (*b*) shows the appropriate metal piece in position.

Cardboard

When pattern and corebox alterations are not of such a permanent nature as those mentioned above, *e.g.*, if a modification is only required for one or two castings, a much quicker and easier way is to use cardboard in place of metal. The correct thickness should be cut, the edges bevelled off,

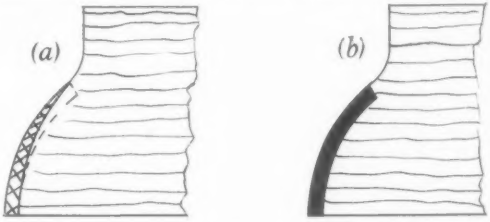


FIG. 2.—*Feather edges of a repair may be avoided by cutting deeper into the pattern when patching—(a) shows the original shape of the pattern, with the extra metal required cross-hatched, and (b) the metal patch, which has been appropriately shaped to avoid a feather edge.*

and the cardboard glued on. Nails will hold it in place until the glue has set, then the edges can be finished off if necessary with a chisel or gouge. If wax is run around the outer edge of the cardboard patch, and finished off with a scraper and sandpaper, a satisfactory finish for varnishing will be obtained. Fig. 3 shows how a temporary alteration was made on a pattern by using cardboard of suitable thickness to reduce the size of a recess.

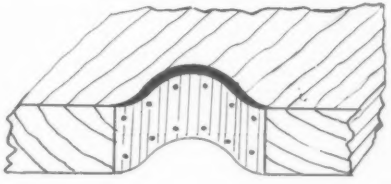


FIG. 3.—*Temporary alteration for which cardboard of suitable thickness has been used.*

Sheet Lead

Sheet lead may also be used to advantage in certain circumstances, especially when existing pattern equipment requires modification. The malleability of lead allows it to be bent to many shapes with little difficulty. In many instances this gives a considerable saving in time compared with fitting wooden pieces. Securing the lead to the wood presents no difficulties, as nails or thin

Pattern and Corebox Alterations

screws can be used quite satisfactorily. Another advantage with sheet lead is that it can be easily pared with a chisel or gouge, either before or after fixing in position, a good clean surface being obtained. Fig. 4 shows a chamber corebox where a modification was requested to reduce the two

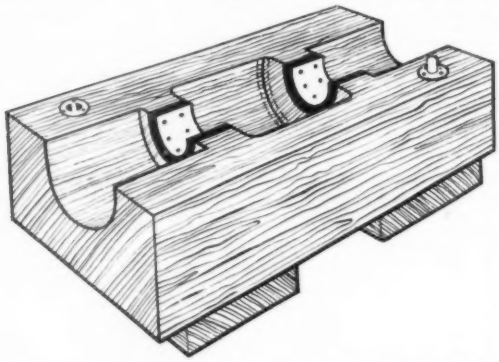


FIG. 4.—*Chamber corebox which has been modified by nailing two lead strips into position.*

smaller diameters by $\frac{1}{4}$ in. This was quickly accomplished by cutting four strips of $\frac{1}{4}$-in. thick sheet-lead (two for each half corebox) of sufficient width. These lead strips were then bedded into position and secured by nails, the surplus lead on the corebox joint and edges of the strips being cut away. Furthermore, when lead is used for a temporary alteration to patterns and coreboxes, it is very easy to remove, the equipment being quickly restored to its original shape.

Metallurgical Properties of Materials at Low Temperatures

Containment of a liquified gas such as methane calls for great skill on the part of the designing engineer and the fabricator, in that the materials employed and methods of construction are concerned with an extremely cold liquid which, if released, would become a highly dangerous flammable gas.

In the 32nd Thomas Lowe Gray Lecture on "Technical and Economic Aspects covering the Ocean Transportation of Liquid Methane" presented to the Institution of Mechanical Engineers on January 27, Dr. John J. McMullen deals with some of the metallurgical problems involved.

Many materials, he states, including all metals, show an increase in strength properties such as hardness, fatigue limit and elastic limit as temperature is decreased. However, certain metals, particularly most steels (carbon and low-alloy), chromium, tungsten, molybdenum, vanadium, etc. (some of which are quite hard and brittle in commercially pure form) crystallize in a body-centred cubic lattice structure. This means that, by the recommended Charpy impact test, within a rather narrow temperature range these materials change from a ductile to a very brittle state at a lower temperature.

A group of metals which do not change in ductility or toughness as temperature is decreased are those single-phase metals that crystallize in a face-centred cubic lattice structure. Metals which fall into this category are copper, silver-brazing metal, cupro-nickel alloy, aluminium and certain of its alloys, gold, nickel, lead, platinum, and the austenitic and stainless-steels. Of the latter, a recent publication has indicated that for low-temperature use $2\frac{1}{4}$ per cent. nickel steel be used down to -75 deg. F., $3\frac{1}{2}$ per cent. nickel steel to -155 deg. F., 9 per cent. nickel steel down to -320 deg. F. and 304 types and 304L stainless-steel down to -452 deg. F. Although almost any of the United States 5000 series of aluminium alloys can be used, the toughest, 5456 aluminium, would probably be the best for low-temperature use.

Naturally, once a particular metal was selected for the containment vessel and associated piping, very meticulous design, fabrication procedures, inspection and testing would be required. In the case of the other hydrocarbon gases, liquefaction is not necessarily the only way of containment. Pressurization is also possible, since the metallurgical properties of a metal containment vessel are then less influenced by low temperature than by ordinary mechanical requirements.

CO_2 in the Jobbing Shop

By "Tramp"

The introduction of the CO_2 Process of moulding and coremaking has led to a number of changes in the traditional practice of jobbing foundries engaged in the manufacture of cast-iron pipes. For example, the time-honoured method of sweeping cores in loam on a "founders' lathe" for straight pipes has given way to the production of cores in a corebox. By this latter method many of the defects associated with the former are avoided. Among these defects, that of a burnt core was the most objectionable, since if this was inadvertently used in the mould a "waster" was almost inevitable. By using CO_2 sand, a pipe core can be made and used the same day, whereas in the older method careful time-consuming drying of the core was necessary.

One shop which produces a large number of pipes of constant diameter has departed from the traditional method of coremaking for this type of casting by employing a metal corebox, made from $\frac{1}{2}$-in. thick steel plate rolled to the correct internal diameter in the platers' shop, and of sufficient length for the longest pipe required. Wooden stopping-off pieces are used to produce shorter pipes when required. In the procedure used at this shop, the half-round box is dropped on to two vee-blocks and the face covered with a layer of sand, the interior being filled with ashes. The joint is then scraped off and a board placed on top prior to gassing. After this operation, the half-core is lifted out and the second half made.

Tax Relief on Improvements by Traders

By "Barrister-at-Law"

It may not occur to every trader that expenditure on the improvement of his trade premises, particularly by the installation of modern plant and machinery, may in fact be achieved in the long run at a very low cost, because of the substantial tax reliefs which may be claimed. The writer briefly summarizes the legal position in the following article.

When a trader, a founder for example, decides to instal new equipment in his works, he may well ask himself: "What constitutes 'machinery or plant'?" There is no statutory definition of the words "machinery" or "plant"—the question, in the last resort one of law, is largely if not entirely a matter of fact. As far as "plant" is concerned, the word is generally employed to describe equipment, utensils, machinery or articles directly used in the *manufacture* of an article or part of an article. Where a trader instals machinery or plant for the first time—excluding from consideration, for the moment, the case where existing machinery or plant is replaced—he is entitled to certain *capital* allowances. In the normal way, but for the special provisions of the relevant Acts which introduced these capital allowances, a trader would not be entitled to any tax relief in respect of capital expenditure on machinery or plant. Such deductions are prohibited by s. 137 (d) of the Income Tax Act, 1952. That paragraph merely allows deductions for *actual* expenditure on *repairs* to premises occupied for the purpose of a trade, or on *supply*, *repairs* or *alterations* to any *implements*, *utensils* or *articles* used in a trade.

After these introductory observations, the position with regard to allowances for expenditure on machinery and plant, and buildings, will now be examined. It is proposed to set out the position prevailing under the new Finance Act, 1959. A distinction must be made between new and second-hand machinery and plant.

ALLOWANCES FOR NEW MACHINERY AND PLANT

"New" for this purpose means brand new. There are two capital allowances which can be claimed in the first year: (*a*) the initial allowance, 10 per cent. of the cost, and (*b*) the investment allowance, 20 per cent. of the cost. If new machinery is installed at a cost of £1,000, for example, the trader can claim, in the first year, £100 as an initial allowance, and £200 as an investment allowance, £300 in all. It is important to note that these allowances are given against the assessment—they will not be allowed as deductions for the purpose of arriving at the profits of the business for tax purposes. Furthermore, since the allowances are reliefs in respect of capital outlay, they are given once and for all. In the first and subsequent years, however, the trader will be entitled also to claim annual allowances in respect of the machinery and plant.

Annual Allowances

Annual allowances for wear and tear (depreciation) may be of two different kinds, though both are designed to lead to the same result. These allowances cannot of course be calculated on the whole of the original cost of the machinery or plant. They must be worked out from the written down value in each year, year by year, of the machinery or plant, though for the first year the annual allowance is given on the full 100-per cent. cost. There is one curious point about this, however, and that is that in calculating the residual value one must completely ignore the amount of the *investment* allowance.

In calculating the amount of the annual allowance, a certain percentage has to be taken (this percentage is agreed by the Inland Revenue with each individual trade). The table of the various agreed percentages can be obtained from the Stationery Office, or on application to the Inland Revenue. It must be observed, however, that these basic agreed rates must in each case be increased by ¼ per cent.

Basic Rate of Wear and Tear

There may be many types of machinery and plant for which no percentage may have been agreed, so the formula for determining the appropriate percentage, laid down by s.281 of the I.T. Act, 1952, must be followed. In substance, what one must do is to estimate the operative working life of the particular machinery or plant, and then spread 90 per cent. of the cost over this period. Thus, if machinery or plant costing £1,000 is likely to have an operative life of about just over 20 years, it would be necessary to spread £900 over that period. As a general rule, it is found that the normal percentage of wear and tear amounts to 10 per cent. per year.

Annual Allowance for the First Year

Suppose now that for machinery or plant which cost £1,000, and in respect of which £100 initial allowance was granted in the first year, the *basic* wear and tear rate is 10 per cent. per year. There is in the first year an annual allowance, in addition to that which could be claimed, of:

$\frac{£1,000 \times 5}{10 \times 4} = £125$. The $\frac{5}{4}$, it will be observed, represents the extra ¼ which is usually added on to

Tax Relief on Improvements by Traders

the basic rate. In the first year, therefore, the trader would receive: (*a*) £100 initial allowance, (*b*) £200 investment allowance and (*c*) £125 first annual allowance = £425. The written-down value of the machinery and plant would then be £1,000 — £225 = £775 (note that the £200 investment allowance would be ignored). In the second year the annual allowance would be:

$$\frac{£775 \times 5}{10 \quad 4} = £96\ 17s.\ 6d.$$

In each subsequent year the written-down values and the annual allowances would gradually diminish.

Straight-line Method

An alternative method of calculating the annual allowance is what is known as the straight-line method (s.282 of the I.T. Act, 1952). In order to have this method applied, the taxpayer must elect to do so when making his claim for the annual allowance, then the amount of the annual allowance each year will be constant. A fixed percentage will be applied year by year to 90 per cent. of the cost price (s.282(2)). Thus taking the example above, the same net percentage, say $\frac{5}{4} \times$ 10 per cent., will be applied each year to £900 (s.282(I) (b)), so that in each year the annual allowance will be the same, *i.e.*, $\frac{£900 \times 5}{10 \times 4}$ = £112 10s.

ALLOWANCES FOR SECONDHAND MACHINERY AND PLANT

Where machinery or plant is secondhand, the investment allowance of 20 per cent. cannot be claimed. What happens in this case is that the initial allowance is stepped up from 10 to 30 per cent. Therefore, taking our above example again, where the cost was £1,000, and the basic wear and tear rate was 10 per cent. each year, in the first year the trader would receive by way of allowances: Initial allowance 30 per cent. of £1,000 = £300, and annual allowance $\frac{£1,000 \times 5}{10 \times 4}$ = £125, making £425 in all. In the next year the *written-down* value would be £1,000 — £425 = £575, and the *annual allowances* for the second year would be: $\frac{£575 \times 5}{10 \times 4}$ = £71 17s. 6d. Here also the straight-line method of a fixed percentage of 90 per cent. of the cost could be claimed as an alternative.

BALANCING CHARGES AND ALLOWANCES

Where machinery and plant is sold, scrapped or replaced by new (or secondhand) equipment, the question of what is known as balancing charges and allowances arises. These items may be explained as follows. Supposing the trader has already received initial and annual allowances in respect of machinery or plant, if secondhand, or investment, initial and annual allowances if the equipment was new (after the Finance Act, 1959, becomes law there will be both initial and investment allowance (in addition to annual allowances) for *new* machinery or plant). The trader may then re-sell the equipment at a figure which, when added to the total allowances he has received to date, is in excess of the original purchase price. Any investment allowance, however, will be disregarded for this purpose (see s.297 of the Income Tax Act, 1952). If he is allowed to keep that excess then he will of course be obtaining an unjustifiable tax advantage. Therefore, in such a case, he will be liable to a *balancing charge* in respect of the excess.

On the other hand, if he has to scrap the articles or receives a very small price for them, he will not yet have received the full tax relief which he would have enjoyed if the life and usefulness of the machinery or plant had been further prolonged. In this case his tax relief is accelerated, as it were, and he is given what is called a *balancing allowance* in respect of the deficiency. The following examples may help to clarify these points.

Example of a Balancing Charge

Initial and annual allowances to date	..	£500
Re-sale price of machinery and plant	..	£800
		£1,300
Deduct original cost of items	.. ..	£1,000
Excess		£300

There is accordingly a balancing charge of £300, which is assessable for tax.

Example of a Balancing Allowance

Original cost of machinery and plant		£1,500
Deduct initial and annual allowances to date	£500	
and		
Re-sale price of machinery and plant	£800	
	£1,300	
		£200

Here there is a balancing allowance of £200, for which tax relief can be obtained.

Replacement of Old Machinery or Plant

Suppose now that old machinery and plant is replaced by new equipment. It is open to the owner, if he so pleases, to have each transaction treated as entirely separate and distinct for the purpose of all allowances and balancing allowances or charges. Taking the above two examples, the trader would be entitled to a balancing charge of £300 in the first instance and a balancing allowance of £200 in the second. Suppose now that he buys, for £1,000, new or secondhand machinery and plant to replace the old. He can start afresh with this new transaction and leave the tax position as it would have been if no replacement had taken place. If he takes this course, then he is liable to a £300 balancing charge (first example) or to a £200 balancing allowance (second example). As regards the new acquisition of £1,000-worth of machinery and plant, he would be entitled (assuming that it was brand new) to an initial allowance of 10 per cent. of £1,000 = £100, an investment allowance of 20 per cent. of £1,000 = £200, and an annual

allowance (assuming a 10 per cent. deduction for wear and tear) of $\frac{5}{4} \times \frac{1,000}{10} =$ £125, a total of £425 in the first year. The written-down value would then be £1,000 — £225 (investment allowance being disregarded) = £775. For the second year, the annual allowance would be $\frac{5 \times 775}{4 \times 10} =$ £96 17s. 6d.

Alternate Method with Balancing Charges

When a balancing *charge* has to be made, an alternative method may be adopted by the trader when he buys replacements, provided that he gives written notice of his choice to the Inspector under s.296 of the Income Tax Act, 1952. What happens subsequently will depend on whether: (*a*) The balancing charge is *greater* in amount than the cost of the machinery or plant replacing the old, or (*b*) the balancing charge is *equal* to, or less than, such cost.

Balancing Charge greater than the Cost of Replacement

In case (*a*), the balancing charge will be made not on the full amount of the charge, but on the excess of the charge over the cost of the new machinery or plant. Further, the new equipment will not be subject to any initial or annual allowance at all, nor it seems to any investment allowance in the case of *brand new* replacements. For example, with a balancing charge on machinery resold of £1,000, and a new replacement costing £700, the adjusted charge would be £300.

Balancing Charge less than, or Equal to, the Cost of Replacement

In case (*b*), the balancing charge on the old machinery or plant will be wiped out, as it were. But the starting figure for the calculation of the initial and other allowances in respect of the replacements will be reduced by the amount of the balancing charge that has been wiped out. For example:

Old machinery and plant is sold, and attracts a balancing charge of £500.

Cost of brand new machinery	£1,500
Deduct balancing charge of £500 (which is wiped out)	£500
	£1,000
Initial allowance 10 per cent. of £1,000 ..	£100
Investment allowance 20 per cent. of £1,000	£200
Annual allowance 10 per cent. $= \frac{5}{4} \times \frac{1,000}{10}$ ..	£125
Total Allowance for the first year	£425

The written down value for the second year will be £1,000 — £225 (investment allowance being disregarded) = £775, and the annual allowance for the second year will be $\frac{£5}{4} \times \frac{775}{10} =$ £96 17s. 6d.

BUILDINGS

As regards buildings, expenditure may be incurred in respect of: (*a*) the erection or extension of new buildings, or (*b*) the repair of existing buildings. The buildings occupied by traders, as distinct from manufacturers, would not be classed as industrial buildings, and the special reliefs for such buildings could not be claimed—the ordinary rules would apply.

In case (*a*), the erection of a new building or the extension of an old building is regarded as capital expenditure, for which no relief could be claimed, except perhaps in cases in which it might be said that the erection was in connection with the installation of machinery or plant. Nor can it be contended that the expenditure ranks for excess maintenance relief under schedule A.

In case (*b*), however, expenditure on repairs to a building used for the purpose of a trade can be claimed as revenue expenditure. This is deductable in arriving at the net profits of the business. Such expenditure may also form the basis of a claim for excess maintenance relief under schedule A. The taxpayer must choose between these two, however. He cannot claim both a revenue deduction *and* excess maintenance relief under schedule A in respect of the same expenditure.

Iron-ore Imports

The appended table shows the tonnage and value of imports of iron ore and concentrates (except chrome iron ore and roasted iron pyrites) in January, 1960, and gives comparative figures for January, 1959.

From	Month ended January 31.		Month ended January 31.	
	1959.	1960.	1959.	1960.
	Tons.	Tons.	£	£
Sierra Leone	63,250	65,690	276,270	303,591
Canada	51,075	124,285	217,694	490,296
Other Commonwealth countries and Eire ..	1,202	3,450	4,944	14,100
Sweden	267,223	371,903	1,709,872	1,996,737
Norway	25,822	40,214	144,839	213,102
France	26,652	41,187	111,139	137,742
Portugal	14,430	40,517	59,464	156,906
Spain	37,578	42,524	192,004	179,482
Algeria	174,075	180,605	983,227	824,507
French West Africa ..	14,724	—	55,537	—
Tunisia	83,229	49,695	469,214	225,657
Morocco (excl. Tangier)	45,426	69,975	235,331	367,059
Liberia	33,100	61,300	191,541	312,259
Venezuela	122,808	160,194	720,321	920,285
Brazil	55,782	41,355	420,276	293,686
Other foreign countries	—	60,199	—	219,874
TOTAL	1,016,376	1,353,093	5,791,673	6,655,283

BARROW IRONWORKS, LIMITED—Mr. Langton Highton has been appointed a director and will become chairman of the company (a subsidiary of the Iron and Steel Holding and Realization Agency) on March 1. Sir John Fisher, who has been acting chairman since the death of Mr. W. Killingbeck, will retire from the chairmanship and will remain on the board. Mr. Highton, who is also a director of Barrow Steel Works, Limited, was, until recently, a director of the United Steel Companies, Limited, and a number of its subsidiaries.

Equipment and Supplies

Aluminium-coated Steel Containers for Investment Moulds

Investment-casting by the "lost wax" method is now used to obtain close dimensional tolerances on intricately-shaped parts by Westinghouse Electric Corporation's materials-manufacturing department in Blairsville, Pennsylvania, USA. For example, in the production of a turbine blade, a wax pattern of the blade is placed in a metal container and a refractory material poured around it. As soon as the refractory or matrix sets, the container is placed in a low-temperature furnace (Fig. 1) to melt the wax, which runs out through a hole in the bottom of the container leaving a cavity the shape of the blade. Then the matrix, still in the container, is put into another furnace. There, the temperature is gradually raised to 982 deg. C. and maintained for 24 hours. This heat-treatment cures or hardens the matrix so it will take the thermal shock when molten metal is poured into the cavity.

High-nickel Alloy formerly used

Because of heat scaling in the curing furnace, Westinghouse formerly used an expensive high-nickel alloy for the matrix container (normally referred to as an investment-casting mould cell). The material costs for these cells made it uneconomical to use them only once and then throw them away. So they were used again and again, and a number of problems arose. In the first place, the matrix had to be removed from the cells with extreme caution to avoid any more damage than necessary. This increased labour costs, and despite careful handling the cells had to be reconditioned between each cast, which was a time-consuming process. What was obviously needed was a material that could be destroyed during the removal of the castings. It had to be cheap enough to justify "one-time-only" usage, and heat-resistant enough to last 24 hours at a temperature of 982 deg. C. Such a material would eliminate the reconditioning step and speed-up removal of the castings.

FIG. 1.—*Investment moulds, in Armco aluminium-coated steel containers, are shown entering a low-temperature furnace where the investment wax is melted out.*

Aluminized-steel Containers

Ordinary carbon steel was first tried, but did not withstand the heat of the curing furnace. Then Westinghouse engineers made up a few cells with Armco Aluminized Steel (Type 1). These worked so well that the company made the use of this metal standard practice, not only at Blairsville but also in their Kansas City plant. Where formerly one man could knock-out only about 60 castings a day, he can now deal with from 140 to 200. All he needs is a ball-peen hammer to break through the stainless-steel wire stitching on the cells. He doesn't have to worry about damaging the cells, since they are used only once. The re-conditioning operation is completely eliminated.

Further Advantage: There is another advantage in using aluminium-coated steel cells. The matrix used in the Westinghouse process forms a semi-solid gelatin on top of the cell that has to be removed. When the high-nickel alloy was used, a paper extension was placed on top of the cell for the gelatin to form in. Then the paper was stripped away and the undesirable material removed. With aluminized steel, the cells are simply made longer than necessary for the casting. The top is then cut off with a high-speed masonry saw, avoiding the troubles previously encountered and providing a flat surface for the cell to rest on when it is turned upside-down for charging with molten metal.

Multi-cell Cyclone Dust-collector

A recent addition to the range of dust-collection and control plant manufactured by the gas cleaning division of W. C. Holmes & Company, Limited, Turnbridge, Huddersfield, is the type UK reverse-flow Holmes-Rothemuhle multi-cell cyclone dust-collector. This unit is said to have a higher collection efficiency than the type RM through-pass collector which was introduced into the United Kingdom in 1957, and to be particularly suitable for those applications where good gas-distribution conditions cannot economically be achieved, and large gas volumes are encountered. The collector comprises an assembly of cyclone cells, the number of which is directly proportional to the volume of gas to be cleaned. Each cyclone cell consists of two concentric tubes: an outer dirty-gas cylinder with a stationary impeller fixed at the inlet, and an inner clean-gas tube which passes up through the centre of the impeller.

The individual cells are supported in a sheet-steel grid, which is in turn enclosed in a rectangular steel casing, the lower half of which serves as the dust bunker. In the upper half of the casing the clean-gas tubes terminate in a stepped floor, the construction of which facilitates the removal of individual cells for inspection and maintenance. In operation the impeller imparts an intense swirl to the dust-laden gas as it enters the cell, causing it to descend with a spiral motion. Near the apex of the conical section of the dirty-gas cylinder the axial velocity of the spiralling gas is turned through 180 deg. The dust-free gas, having reversed direction, passes up through the clean-gas tube to the exhaust fan and stack. The reversal of direction of flow causes the dust to be centrifuged and propelled downwards into the dust bunker.

Clay-content Apparatus

An automatic apparatus for determining the clay content (*i.e.*, particles finer than 20 microns) in foundry sands and similar material has been developed by George Fischer, Limited, and is available in this country and Eire through the sole agents, Foundry Suppliers, Limited, 25a, Cockspur Street, London, S.W.1. The apparatus, which is based on the elutriator principle, somewhat resembles Boswell's traditional design in appearance, and is said to relieve the sand technician of the time-consuming phase of the standard method for determination of clay in moulding sands. With the new equipment, the clay content is estimated as follows: (1) The sand sample (which has been boiled in water and mechanically stirred) is put into the glass vessel by means of a funnel; (2) by means of a needle valve, the water flow is so adjusted that the speed of the rising flow in the cylindrical part of the vessel is equal to the settling speed of particles of 20 microns and larger; (3) all particles finer than 20 microns (representing the "standard clay content" of the sand) are then removed automatically and continuously from the sample; (4) as soon as the water in the cylindrical part is entirely clear, the total contents of the glass vessel can be drained into jars, and (5) the excess water in the jars can be syphoned away, the washed sand being filtered off and dried and its loss in weight determined.

Electric Motor for Vibrating Drives

An electric motor specially designed for vibrating drives, the first of its type to be made in the United Kingdom, is being produced jointly by English Electric Company, Limited, Marconi House, Strand, London, W.C.2, and Grantham Electrical Engineering Company, Limited, 6, Wharf Road, Grantham. It is claimed that this completely self-contained unit provides an inexpensive and reliable drive by eliminating all the mechanical parts associated with an eccentric shaft arrangement. Vibration is generated by out-of-balance weights at either end of the motor which can easily be adjusted by single bolts to give the required output. The motor is of robust construction, having heavy-duty bearings with special features to deal with out-of-balance loads, and tests have shown that a bearing life of thousands of hours can be expected —the bearings are lubricated for life. The unit is totally enclosed, and is dust- and weather-proof. The frame is made from nodular cast-iron, with integral feet, and the shaft of high-tensile steel to withstand the high centrifugal forces to which it is subjected. Because of its vibrating motion, the motor must be mounted on a resilient base. Operating at 1,500 r.p.m. synchronous speed, it has a power output of up to 7,500 lb. centrifugal force, or 10,000 lb. at 3,000 r.p.m.

Spray Gun for Vitreous Enamelling

Following extensive tests and development work in conjunction with Ferro Enamels, Limited, Alfred Bullows & Sons, Limited, Long Street, Walsall, have produced equipment for applying vitreous enamels at very low air-pressures. This technique offers, it is claimed, several major advantages to the enameller. First, there is a definite economy in enamel used. Second, with a low-pressure nozzle it is a simple matter to obtain a very fine coat which, when fired, is far less brittle than a thick enamel coat would be. Third, the low-pressure technique requires far less skill than normal production methods. Finally, when spraying hollow objects, such as bread bins, spin-dryer bowls, etc., "bounce" is a serious problem at normal pressures—it is claimed that this job is easy when using the new technique.

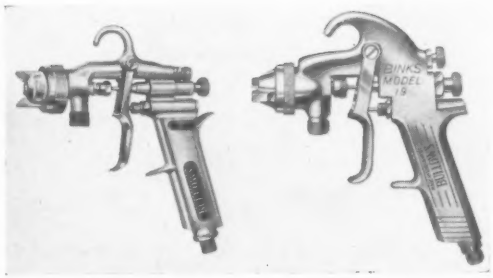


FIG. 2.—*Spray guns fitted with special nozzles for applying vitreous enamels at low air-pressures, now being marketed by Alfred Bullows & Sons, Limited, of Walsall.*

Conditions recommended for Optimum Results

Suitable nozzles have been developed for the technique on the L1900 Bullows-Binks model 19, and L200 model 2, spray guns (Fig. 2). When using the L1900, best results are obtained with fluid pressures varying between 5 and 12 lb. per sq. in., and an air pressure of 25 lb. per sq. in. using 63B × 66PH set-up. With the L200, a fluid pressure of 5 lb. per sq. in., and an air pressure varying from 25 to 50 lb. per sq. in. can be used, with the A39 × A5P set-up. The material used for all the tests was a standard cover-coat enamel having a specific gravity of 1.34 and a fineness of 3½/200/50. A parallel development is that, whilst mottling in the vitreous-enamel trade has generally been considered a slow process, a significant increase in speed is claimed to be possible with the L200 spray gun. A fluid pressure of 5 lb. per sq. in. and air pressure of 8 lb. per sq. in. should be used, with the A39 × A8P nozzle set-up.

EFCO and Stein & Atkinson co-operate

The Electric Resistance Furnace Company, Limited, and Stein & Atkinson, Limited, announce that they have joined forces in a new company, namely, Foundry & Metallurgical Equipment Company, Limited, with headquarters at Netherby, 161, Queens Road, Weybridge, Surrey. This company will design, manufacture and supply an extensive range of foundry equipment, including: Gas- and oil-fired crucible melting furnaces; gas-, oil-fired- and electric annealing furnaces and ovens specifically for foundry use; batch and continuous core-stoves; coreblowers; mould dryers; sand dryers; shell-moulding and shell-closing machines, and gravity-die-casting equipment. In addition, they will manufacture and supply, under licence, a rotary reactor for desulphurizing iron and steel using a new method developed in the USA by the Diamond Alkali Company. The new company will also offer complete hot-blast cupola plants embodying air-heaters of the Escher type, and with a water-jacketed reaction zone.

Other arrangements have been completed, (*a*) with Sinex Engineering Company, Limited, for the new company to offer their vibratory equipment for knockout grids, screens, feeders and conveyors for the foundry industry, and (*b*) with Aldridge Industrial Oils of Cleveland, USA, for the sale of die-lubricants. The directors of the new company are: Mr. D. F. Campbell (chairman), Mr. C. J. S. Atkinson, Mr. J. A. Monks and Mr. C. H. Williams, the consulting metallurgist being Dr. A. G. Robiette.

"Foundry Science and Engineering"

Post-graduate Course at Birmingham

One of the characteristic features of post-war industrial development is the increasing contribution made by scientific ideas to the development of industrial processes. The universities are playing no small part in this development and one of their important contributions is the expansion of post-graduate training.

A post-graduate course was inaugurated by the Industrial Metallurgy Department of the Birmingham University in 1958, and it is now proposed to repeat this course during the 1960-61 session. The course does not compete with that given at the National Foundry College at Wolverhampton, rather its aim and scope are complementary to those of the Foundry College. The broad aim is to provide advanced university training in the combined fields of foundry science and engineering. It is assumed that students have had prior training in metallurgy, science or engineering up to degree standard. The basic course of lectures and practical work is planned to be completed by full-time study in three terms beginning early in October. Full-time students proceed to a diploma or to a M.SC. degree: the former qualify through an examination held in June, whilst the latter, in addition to the examination, have to prepare a dissertation on a selected subject. This work may be completed by the end of September.

The subject matter of the lectures is arranged to give an outline of the basic principles, but in the main will deal with advanced scientific knowledge and applications. For the benefit of those candidates who have not had adequate training in metallurgy, arrangements could be made for them to take suitable additional courses during their post-graduate year.

Syllabus

The course has been planned to include eight to ten lectures per week. The remaining time is used for laboratory work, seminars, discussions and works visits. The following subjects are covered during the session:

A. Foundry Engineering

(1) *Sand founding:* (*a*) *Foundry sands:* base and bonding materials. Sand preparation, plants and methods of control. (*b*) *Moulding:* Patterns, moulds and cores. Gates and risers. Fettling and finishing. (*c*) *Foundry plant and layout:* moulding and core-making machines. Mould drying. Ventilation. Mechanical handling and layout. Application of time and motion studies. Progressing; and (*d*) *Castings:* design, properties, defects, heat-treatment. Inspection and control. (46 hours.)

(2) *Metal mould and specialized founding:* Gravity, pressure, precision and centrifugal founding. (8 hours.)

(3) *Melting furnaces and processes:* Flame- and electric-furnaces for non-ferrous metals. Cupolas. Steel melting. Vacuum melting. (9 hours.)

(4) *Casting of non-ferrous and steel ingots:* Developments in batch and continuous methods of ingot casting. (6 hours.)

(5) *Refractories.* (5 hours.)

(6) *Recent developments:* Recent developments in foundry technology, *e.g.*, pressure, shell and CO_2 moulding. Special foundry techniques in nuclear engineering. Founding of titanium alloys. Automation in the foundry. (10 hours.)

(7) *Production engineering and management:* This course will be arranged in co-operation with the Department of Engineering Production of the University to meet special requirements of students in foundry processes. (23 hours.)

B. Foundry Science

(1) *Physical chemistry of melting processes: Principles and Applications.* Brief review of basic concepts. Chemical reactions in metal-melting systems. Slags and fluxes. Control of impurities including hydrogen, oxygen, carbon, sulphur and phosphorus. Combustion of fuels. Protective atmospheres. (Formal lectures about 20 hours.)

(2) *Metallurgy of melting and casting:* The liquid state and its properties. Solidification: volume changes, nucleation, crystal growth, segregation. Zone melting. Vacuum melting. Cast structures: types, properties, stresses, defects and methods of control. Flow of metal in gates. Heat transfer during solidification and application to risers. (20 hours.)

(3) *Properties, developments and uses of casting alloys:* Zinc, aluminium, magnesium, copper and nickel base alloys. Cast irons and steels. (12 hours.)

(4) *Physical, mechanical and chemical methods of testing:* Test-bars and castings. Deformation and failure. Developments in chemical, optical, magnetic and X-ray techniques. (12 hours.)

(5) *Statistics:* Basic concepts. Applications to foundry processes and methods of control. (10 hours.)

The inclusive fee for the course is £81. In certain cases where a student is not sponsored by an employer, the University will consider applications for remission of this fee and where necessary for the grant of a maintenance allowance during the period of attendance. Forms of application may be obtained from the Registrar, The University, Edgbaston, Birmingham, 15, and further information about the course is available from the secretary of the Department of Industrial Metallurgy at the University.

British Standards Institution

Playground and Physical Education Equipment

A group of three standards dealing with playground equipment for parks (BS.3178) and schools (BS.3191) and portable equipment for physical education for primary schools (BS.3194) has recently been published by the British Standards Institution, 2, Park Street, London, W.1. BS.3178, Part 1, refers to the use of fittings in grey cast iron (to BS.1452, grade 10), s.-g. and malleable cast iron. Further parts of the standard will deal with particular types of apparatus. BS.3191 and BS.3194 do not specifically refer to iron castings but the responsible committee is to consider whether a reference should be made to the use of cast-iron couplings. (For further information on this subject, member-firms of the Council of Ironfoundry Associations are invited to apply to the secretary of the Association.)

Surface-plates

A standard which applies to circular cast-iron high-precision surface-plates having a maximum diameter of 14 in. (BS.869:1939) has recently been reviewed and confirmed as satisfying present requirements. An appendix gives the composition of plain and alloy cast-irons which, when appropriately heat-treated, have given satisfaction, although it is admitted that there are other suitable compositions of alloy cast-iron which give a uniform sorbo-pearlitic structure possessive of high hardness and wear-resistance.

SAMUEL FOX & COMPANY, LIMITED, Stocksbridge, Sheffield, have installed in their central engineering workshops a battery of automatic-vending machines, which provide a continuously-available service of hot meat-pies, cups of coffee and cartons of milk.

Iron Castings Production

The latest figures emanating from the Iron and Steel Board reveal that production of iron castings in the fourth quarter of 1959 was 989,160 tons—an increase of 21 per cent. on output in the similar quarter of 1958. Other information released by the Board concerns quarterly production for 1958 and 1959, and district production in the fourth quarters, details of which are given in Tables 1 and 2.

JIC Comment

Commenting on these figures the Joint Iron Council states that after starting the year with production at very low levels recovery was under way about mid-year, and the output for the final quarter was the highest for a fourth quarter ever recorded except for that of 1955. The low output of the first half-year was more than balanced by the improved output of the second, and the year as a whole showed a rise in the rate of output of nearly 3 per cent. compared with 1958.

Main Sections

In Table 3, which shows a comparison of output of iron castings in the fourth quarter and year 1959 with output in 1958, the statistics relate to both grey- and malleable-iron castings.

TABLE 1.—*Quarterly Production of Iron Castings, 1958 and 1959.*

	1958* (tons).	1959 (tons).
First Quarter	961,150	828,100
Second Quarter	887,210	878,590
Third Quarter	742,660	802,180
Fourth Quarter	877,570	989,160
	3,468,590	3,498,030

* 53 weeks.

The automobile section, which had a busy year in 1958, went ahead again in 1959 and exceeded the previous year's output by 23 per cent., reaching an output in the fourth quarter nearly 43 per cent. greater than in the fourth quarter of 1958. The engineering section, in sympathy with some of the capital goods industries it serves, experienced poor trading in the first three quarters of the year but recovered quite sharply in the final quarter when better conditions began to develop in some capital-goods industries. After a poor year in 1958, the output of the building and domestic section rose significantly in 1959, and reached an all-time record in the final quarter. Pressure-pipes and fittings production, aided by a marked improvement in the final quarter, exceeded 1958 by a significant margin and the output of ingot moulds rose steeply in sympathy with the recovery in the steel industry. In contrast to the experience of the other sections, railway equipment fell steeply and this is explained largely by the phasing of the railway modernization plan.

TABLE 2.—*Production of Iron Castings, by District.*

District.	Iron castings (tons). Fourth quarter† 1958.	Fourth quarter. 1959.
Northern	74,850	91,110
North West	90,720	96,130
Yorkshire	91,330	102,410
East Midlands	181,360	212,320
West Midlands	195,720	226,690
Eastern and Southern counties	95,760	104,830
Scotland and Northern Ireland	83,300	88,870
Wales and Monmouthshire	64,530	66,800
Total	877,570	989,160

† 14 weeks.

TABLE 3.—*Output of Iron Castings, by Section.*

Section.	Year. 1958* (thousand tons).	1959 (thousand tons).	Percentage change.	Fourth quarter. 1958† (thousand tons).	1959 (thousand tons).	Percentage change.
Automobile (including tractors)	551.0	678.0	+ 23.0	135.1	193.0	+ 42.9
Engineering (*a*)	1,170.1	1,127.6	- 3.6	271.3	310.1	+ 14.3
Building and domestic	498.8	548.7	+ 10.0	133.5	154.7	+ 15.9
Pressure pipes (*b*) and fittings	490.4	515.6	+ 5.1	118.5	149.0	+ 25.7
Ingot moulds (*c*)	354.0	389.4	+ 10.0	77.9	123.4	+ 58.4
Railway equipment	338.9	238.8	- 29.5	78.6	59.0	- 24.9
Total	3,403.2	3,498.1	+ 2.8	814.9	989.2	+ 21.4

* 1958 was a 53-week statistical year: the figures reported have been adjusted to a normal 52-week period.
† The fourth quarter of 1958 covered a 14-week period and the table has therefore been adjusted to a normal 13-week period.
(*a*) Including machine tool, textile machinery, electrical, shipbuilding, etc. (*b*) Mainly gas and water. (*c*) Mainly for the steel industry.

Law Case

Labourer awarded £1,750 Damages

Damages of £1,750 were awarded by a jury sitting with Lord Migdale in the Court of Session to Mr. John Drever Purves who, as reported in last week's JOURNAL, was claiming £4,000 damages from his employers, MacTaggart Scott & Company, Limited, Station Iron Works, Loanhead, Edinburgh, for injuries sustained when he was knocked down and run over by a crane in February, 1956.

House Organ

Newsletter, Vol. 12, No. 1. Issued by David Brown Industries, Limited, London, W.1.

Understandably, this issue stresses the events connected with the winning of the Sports Car World Championship in 1959 by the company's Aston Martin car. News is also given in the magazine of the starting up of a new David Brown factory in Madrid for the production of commercial vehicle gear-boxes and gears. The social activities of the employees are as usual given a prominent place.

F

Notes from the Branches

Stoke-on-Trent Section

This year, the Stoke-on-Trent section of the Institute of British Foundrymen held its annual dinner/dance (on February 19) at the Grand Hotel, Hanley, more than 200 members and guests attending, several being from the parent branch (Lancashire). After an excellent five-course dinner, Mr. G. H. Charsley (president of the section), proposed the Loyal Toast after which Mr. C. H. Wilson (national president) proposed the toast of the Institute coupled with the Stoke-on-Trent section. The response was made by Mr. Charsley, Mr. J. Dowell (vice-president of the section) proposed the toast to the guests and ladies, and the Rt. Worshipful the Lord Mayor of Stoke-on-Trent (Alderman H. Clowes, O.B.E., J.P.) replied. The Lord Mayor was accompanied by the Lady Mayoress, also among the top-table guests were the Mayor and Mayoress of Newcastle-under-Lyme (Mr. and Mrs. W. E. Welsbey). As the formal proceedings ended, several gift presentations of pieces of Staffordshire china were made. The Lord Mayor presented Mrs. Wilson with a coffee set, and Mr. Wilson with a plaque in Wedgwood. In turn, Mr. Wilson, on behalf of the section, reciprocated by giving a coffee set to Mrs. Charsley. Dancing until 1 a.m. followed, with Mr. B. Cordall as M.C., and the whole function was enjoyed to the full by all who attended.

Northampton Section

The lecturer at the January meeting of the Northampton section was Mr. H. G. C. King, who presented his paper entitled "An Introduction to Patternmaking in Plastics." Although this was the 16th occasion on which Mr. King had given this particular lecture, the meeting at the Wellingborough Technical College was well attended and the paper promoted a very lively discussion.

The three methods of making plastic patterns from plaster forms, detailed by Mr. King, were by using solid resin, resin backed by a former and the laminated type. In speaking of the advantages to be gained from using plastic patterns, Mr. King pointed out that they were harder wearing than those made from timber or metal, they had better expansion characteristics, and storage properties; he then made a comparison of costs relative to patterns in other materials. Further considering advantages to be gained, Mr. King produced a number of plastic patterns which he had made himself, the high finish of which, he said, had definitely improved the surface of the castings produced from them. Another very useful quality was the ease with which a repair to a broken pattern could be made. Similarly the lecturer explained parts worn away could be made good by building up the original pattern to beyond its correct size and filing it back to shape.

Although, said Mr. King, the process was not likely to supersede timber and metal patterns, which would continue to be used for specific purposes, generally a good case could be made for the use of plastic patterns where speed of manufacture and cost were important—this particularly so where more than one pattern was mounted on a plate.

In dealing with the numerous questions which followed presentation of the paper, Mr. King indicated that the process called for no expensive equipment or special training; care and cleanliness, he said, were the important points. On the subject of coreboxes he said he had had no experience in blowing plastic coreboxes, but a number of hand-rammed boxes had been made and the plastic material had been found to be very satisfactory for this purpose.

Mr. R. Jelley, senior vice-president, proposed the vote of thanks to Mr. King remarking how interesting the subject was and how well the lecture had been presented; Mr. E. E. Robinson, who seconded the proposal, also thanked Mr. King for travelling all the way from Eastleigh to attend the meeting.

London

Over 200 attended the first meeting this year of the London branch held at the Constitutional Club, W.C.2. The programme was specially designed to interest apprentices and nearly half of those attending were groups of trainees made up from various foundries, engineering works and technical colleges in the London area, all of which had been circularized beforehand with details of the meeting. Following the pattern of

Group photographed at the annual dinner of the Stoke-on-Trent section of the Institute. Front row, left to right: the Lady Mayoress of Stoke-on-Trent, Miss Christine Clowes; section president, Mr. G. H. Charsley; Mrs. Charsley, and the Mayoress of Newcastle-under-Lyme, Mrs. W. E. Welsbey. Second row centre: the Lord Mayor of Stoke-on-Trent, Mr. Harold Clowes, O.B.E., J.P., and the Mayor of Newcastle-under-Lyme, Mr. W. E. Welsbey, J.P. Also in the picture (third row, right) are Mr. C. H. Wilson (IBF president); Mrs. Wilson, and Mr. J. Bailey (Stoke-on-Trent section secretary).

[Photograph by courtesy of the *Staffordshire Sentinel*.

previous successful events of this type, the meeting was in the form of a "Brains Trust" with the apprentices firing questions at a panel of experts. Mr. A. Talbot was chairman of this panel, supported by Mr. D. Morris, Mr. F. C. Hayes, Mr. W. Dean (deputizing for Mr. B. Levy), and Mr. Geo. C. Pierce. First, the branch president, Mr. John Bain, introduced the panel to the meeting and explained that prizes of 50 cigarettes would be awarded to any whose questions were not—in the opinion of the meeting—answered adequately by the experts.

Questions were many and various and all showed great keenness on the part of the London-area apprentices. Typical questions were: "What is tin sweat on gunmetal castings, and how can it be prevented?" "Why is it that when nickel is added to cast iron it only affects the free carbide and not the matrix structure?" "Can anything be added to greensand to stop it drying out?" "Why can't air hardening cores have air injected under pressure to speed up the reaction?" "What is the effect of addition of calcium silicide to molten iron, where does the reaction take place and what is left?" "When were top-parts first used in the history of moulding?" "Does the panel think it necessary to have a five-years' period for foundry apprentices?" "Will there always be jobs for craftsmen in the foundry industry?" "What was the cause of excessive burn-back in a 10-in. dia. experimental cupola and what refractory could be adopted to prevent it?" "What is the meaning of levitation melting?" "What is Tantiron and how can it be machined?" "How can drying cracks be prevented in a large dome-shaped mould?" "Is cellulose paint necessary on patterns to prevent sticking of CO_2 sand?" "What was the reason for a bad surface on Monel-metal castings?" "How can warping of open-sand-moulded plates be prevented?" "What are the relative advantages of solid chills as compared with bonded iron shot?" In the main, the answers given to these were agreed as satisfactory, but prizes were awarded in other cases where the question had particular merit. A weakness was found in respect of answers to questions on ironfoundry and general metallurgy and the panel was strengthened in this respect by the co-option of Mr. J. Faulkner from the audience, who proved competent in answering this type of question. At its conclusion, the meeting was voted a complete success; it was particularly felt that the great variety of questions and answers had been helpful also to those present who represented the general membership of the branch.

Birmingham

Details have now been circulated to the respective memberships about the joint works visit of the Birmingham and London branches which is to take place on March 10. This year, the Birmingham branch has made all the arrangements and the joint parties are to tour the Imperial Foundry of the Ford Motor Company, Limited, at Leamington. Both parties will travel by coach to rendezvous for luncheon, before going on to the works, the Birmingham branch being the hosts. The Leamington works of the Ford Motor Company produces iron, steel and malleable castings (including crankshafts and camshafts) and facilities are available in the works for machining about 45 per cent. of the total. The factory buildings occupy 4¼ acres and over 1,400 persons are employed. It is expected that all available places on the visit will be taken up, so great is the popularity of the function. (It will be remembered that last year the London branch arranged a similar joint visit, on that occasion to Ford's Thames Foundry, near Dagenham.)

Coventry Section

The Coventry and district section of the Birmingham branch of the Institute announces that it will be holding its final meeting of the 1959/60 session on May 10, at 7.30 p.m. at the Stermet Hall, Gipsy Lane, Nuneaton. It will be in the form of a forum, entitled: "Casting Makers and Users Forum, No. 1: the Aircraft Industry." Members of the panel from the aircraft industry will include:—Mr. K. W. Clarke, chief of laboratories, De Havilland Aircraft Company, Limited; Mr. T. Payne, group chief inspector, De Havilland Propellors, Limited; Mr. A. Thomas, chief designer, Bristol Siddeley Engines, Limited, and Mr. L. F. Wallis, weight engineer, D. Napier & Son, Limited. The foundry industry will be represented by Mr. M. M. Hallett, director, Chamberlin & Hill, Limited; Mr. A. Short, foundry manager, Rolls-Royce, Limited; Mr. W. J. Sully, joint managing director, Sterling Metals, Limited, and Mr. D. F. B. Tedds, foundries manager, Bristol Siddeley Engines, Limited. The section president, Mr. T. Player, will be in the chair. Invitations to attend are extended to engineers and foundrymen interested in this branch of engineering, and written questions are invited. Aircraft castings will be exhibited, and if there is sufficient interest, a visit to the production foundries of Sterling Metals, Limited, can be arranged for the afternoon. Those intending to participate, particularly if bringing parties, are asked to communicate with the section honorary secretary, Mr. M. R. J. Evans, 48, Stewart Street, Nuneaton, Warwicks, in order that adequate arrangements can be made.

Southampton Section: Change in Programme. Mr. H. G. C. King has very kindly consented to present his paper on "Patternmaking in Plastics" to the meeting of the Southampton section on March 23, in lieu of Mr. Zehnder's lecture which was originally planned for that date.

Allied Ironfounders' Acquisitions

Allied Ironfounders, Limited, founders and manufacturers of heating and cooking appliances, have acquired two companies producing boilers for domestic, commercial and industrial heating. The companies are Watts Metal Industries, Limited, of Lydney, Gloucestershire, and Frederick Kay (Engineering), Limited, of Chesham, Bucks. Watts Metal Industries are producers of a wide range of solid-fuel-fired and oil-fired boilers. Frederick Kay (Engineering), Limited, besides producing large steam-raising boilers, are one of the largest manufacturers of domestic gas-boilers in the country. The effect of the acquisition is to extend the group's range of boilers to include commercial and industrial models with outputs up to 10,000,000 B.T.U's, making about 50 models in all.

Data Sheets. Two data sheets covering Sillmax "1" and Numax—two refractories entering the high-duty class—have been issued by General Refractories, Limited, Genefax House, Sheffield, 10. It is interesting to note that figures are given which correspond to the German specification DIN 1064, for refractoriness under load.

IN CONNECTION with the attainment of the twenty-first anniversary of the British Coal Utilization Research Association a bibliography of all its publications during 1938 to 1959 has been printed. Copies are available from the liaison and publications officer, BCURA, Randalls Road, Leatherhead, Surrey, price 5s. post free.

Personal

Mr. E. F. O. GASCOIGNE has been appointed a director of Winget, Limited.

Sir CUTHBERT CLEGG has been appointed to the board of Stone-Platt Industries, limited.

Mr. F. HARMAN, commercial manager of Tangyes, Limited, has been appointed a director of the company.

Mr. A. H. C. GREENWOOD has been appointed an additional director of Vickers-Armstrong (Aircraft), Limited.

Mr. HAROLD D. WINTER, sales director of British Northrop, Limited, has retired after 46 years with the company.

Captain G. E. COLES has been appointed an additional director of the Barrow Haematite Steel Company, Limited.

Mr. P. SPRAWSON, secretary and chief accountant of the British Piston Ring Company, Limited, for the last eight years, has been appointed to the board.

Mr. C. M. GRANT has been appointed sales manager of Henley Foundries, Limited (one of the AEI group of companies), of Banners Lane, Cradley Heath, Staffs.

Mr. JOHN WORSWICK has been appointed a director of Moorwoods, Limited, a member of the Brightside group of companies. He will be responsible for sales.

Mr. PETER B. GORST, export manager, Ransomes & Rapier, Limited, has been appointed assistant general sales manager, in succession to Colonel E. W. HARDFIELD.

Mr. JOHN AUGSTEIN, of Foundry Suppliers, Limited, Cockspur Street, London, S.W.1, is to visit the American Foundrymen's Society Exhibition which is being held in Philadelphia in May.

Mr. A. H. WOOD, late foundry manager of J. Stone & Company, Limited, Charlton, has taken up a new appointment as technical representative with H. J. Maybrey & Company, Limited.

Mr. R. H. G. SUTTON, managing director of Urquharts (1926), Limited, manufacturers of combustion engines, Perivale, Middlesex, has been appointed deputy chairman and will continue as managing director.

Mr. J. E. SMITH, managing director of the National Gas and Oil Engine Company, Limited, has been elected to the board of Mirrlees, Bickerton & Day, Limited. Both companies are members of the Hawker Siddeley group.

Mr. D. H. ROBERTS, secretary of Metal Industries, Limited, has been appointed secretary of Lancashire Dynamo Holdings, Limited. Mr. H. G. CARTER and Mr. S. G. MUNDY have resigned from the board of the latter company.

Mr. WILLIAM K. WHITEFORD, formerly of Toronto and now president of Gulf Oil Corporation, Pittsburgh, has been elected a member of the advisory committee of the International Nickel Company of Canada, Limited.

Mr. J. W. GARDOM, of John Gardom & Company, Ripley, near Derby, is flying out to India this week and expects to be away for about 10 days. This trip is principally in connection with a malleable-iron foundry project in Calcutta.

Captain E. C. CLARKE withdrew from the managing directorship of Saunders-Roe, Limited, and from the board of Westland Aircraft, Limited, on March 1. Mr. W. H. D. WINKWORTH has been appointed in charge of Saunders-Roe as from that date.

Shardlow Micrometers, Limited, Peter Street, Sheffield, announce that Mr. J. C. PROUDFOOT has been appointed chairman of the board and Mr. H. MITCHELL has been made managing director. Mr. A. SEAGRAVE and Mr. J. W. JACKSON have been appointed directors.

Mr. CLIFFORD SHAW of Shaw Processes Limited and Zirconal, Limited, left this week for India, for discussions on the establishment of a Shaw Process development corporation in India, and also the establishment of production of zirconal-type refractories for the area.

As a result of the offer by Albright & Wilson, Limited, for the capital of A Boake, Roberts & Company (Holding), Limited, having become unconditional, Mr. F. G. PENTECOST, chairman of A. Boake Roberts, has been appointed a director of Albright & Wilson.

Mr. F. E. WILSON has been appointed managing director of B. Elliott (Machinery), Limited. He also joins the boards of Victoria Machine Tools Company, Limited, and Cardiff Lathe and Tool Works, Limited. All three companies are subsidiaries of B. Elliott & Company, Limited.

Ferro Enamels, Limited, Wombourn, Wolverhampton, announce the appointment of Mr. JAMES K. HOSSACK as general manager. Mr. Hossack was born in Montreal in 1915, and has been with Ferro Enamels (Canada), Limited, for the past 25 years. He is a past-president (1955) of the Canadian Ceramic Society.

Mr. HIRAM BROWN has joined the staff of Battelle Memorial Institute as consultant to the Department of Metallurgy. He joined the Columbus, Ohio, research centre staff from Solar Aircraft Corporation, where he was technical adviser to the vice-president and general manager of the Des Moines, Iowa, plant.

Following the appointment of Mr. R. N. MILLAR as managing director of the engineering group of the General Electric Company, Limited, the following three new appointments have been made at the company's engineering works at Erith and will be effective from April 1: Dr. K. J. WOOTTON to be general manager; Mr. C. J. O. GARRARD to be deputy general manager, and Dr. H. K. CAMERON to be manager, atomic energy division, Erith.

The Minister of Power has re-appointed the following members of the Iron and Steel Board as from June 1: Sir LINCOLN EVANS, C.B.E., deputy chairman; Mr. A. G. STEWART; Mr. A. E. PEARCE; SIR CHARLES CONNELL; Sir HENRY SPURRIER, and Sir KENNETH HAGUE, all as part-time members. The appointment of Sir Lincoln Evans, who has been full-time deputy chairman of the Board since it was formed, will be on a part-time basis from June 1.

LORD CHANDOS, chairman of Associated Electrical Industries, Limited, has been appointed president of the Locomotive and Allied Manufacturers' Association of Great Britain for 1960. Mr. G. COLLINGWOOD, managing director of the Vulcan Foundry, Limited, has been appointed chairman of the Association. Lord Chandos and Mr. Collingwood respectively succeed LORD NELSON OF STAFFORD and Mr. G. T. OWEN, who have held office for the past two years.

Mr. FRANCIS VINCENT EVERARD, who has been elected president of the Engineering and Allied Employers' National Federation, is works executive director of Belliss & Morcom, Limited, Birmingham, and a director of Metallisation, Limited, Charles Clifford, Limited, W. Sisson & Company, Limited, and of Newey & Eyre, Limited. He has been a member of the management board of the Birmingham, Wolverhampton and Stafford branch of the Federation for some years.

Dinner

WORSHIPFUL COMPANY OF FOUNDERS

The Livery dinner of the Worshipful Company of Founders was held last Monday at the Grocers' Hall, London. It was presided over by Mr. Arthur C. Jennings, M.A., the Master, who had as his principal guest the Rt. Hon. the Lord Mayor, Alderman Sir Edmund Stockdale. At the high table were Lord Mills, K.B.E., P.C., HM Paymaster General; Mr. P. J. C. Bovill (Master Cutler); Mr. C. C. Booth; Mr. R. F. Rothwell; Sir John C. Masterman, O.B.E., M.A.; Sir Denis Truscott; Lord Dudley Gordon, D.S.O., LL.B.; Mr. Alderman and Sheriff H. Pitman, O.B.E.; Mr. E. A. Pearson; Mr. D. L. Farrant (secretary, Council of Ironfoundry Associations); Lt.-Col. N. W. Dorrity; Mr. N. P. Newman, C.B.E., J.P. (president, Joint Iron Council); Major S. V. Dickins, J.P.; Major P. L. Peak; Mr. A. H. Sully (director, British Steel Castings Research Association); Mr. Angus MacKinnon; Mr. Brian Melland; Col. R. H. Studholme, O.B.E.; Mr. H. L. Light; Mr. C. H. Wilson (president, Institute of British Foundrymen); Mr. Guy D. Hadley; Mr. L. B. Helder; Mr. Sheriff Cyril Derry; Mr. G. W. Ilsley, A.C.A. (immediate past-Master); Mr. S. R. Walker, C.B.E., C.C.; Mr. D. C. Shankland; Mr. John C. Taverner; Mr. Leonard J. Bartley; Mr. J. Arthur Taylor (past-Master); Mr. A. Stanley Young, F.R.B.S. (past-Master); Mr. L. H. C. Athill; Mr. E. J. Mornement; Mr. S. G. Lawrence; Mr. Douglas S. Young (past-Master); and Mr. W. Stovin-Bradford.

In addition to the Master and the Lord Mayor, the toast list included the names of the Under Warden (Mr. Guy D. Hadley), Sir John Masterman, O.B.E., M.A. (Provost of Worcester College, Oxford), and Lord Mills. During the evening, the company was entertained by Mr. Stephen Savage, a brilliant young pianist.

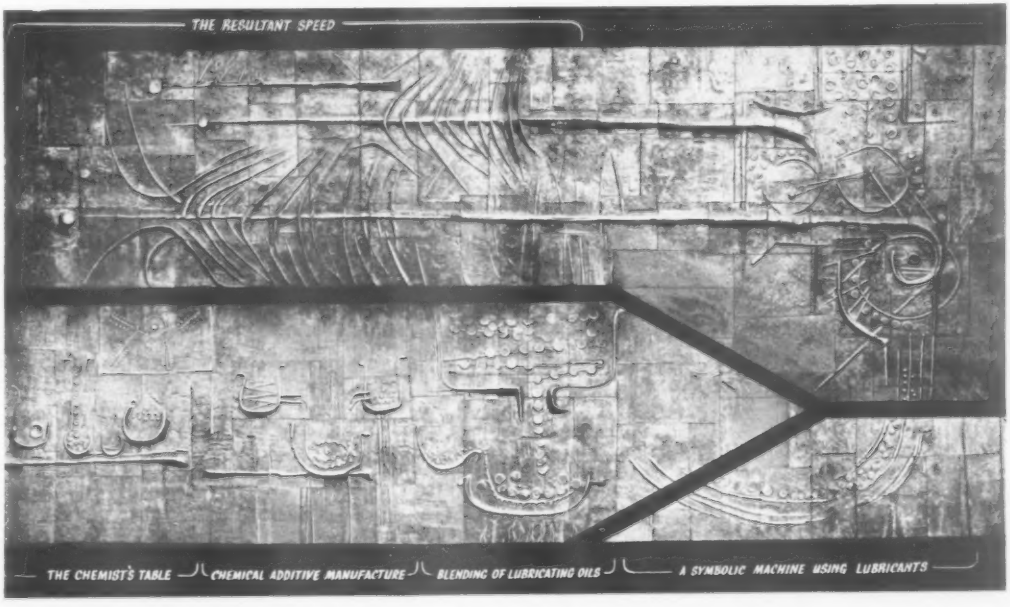
New Foundry Film

Hard & Fast, a 16-mm. sound and colour film, running time 16 minutes. Produced by and available on loan from the Distillers Company, Limited, chemical division, carbon-dioxide department, Devonshire House, Piccadilly, London, W.1.

This is an excellently produced instructional film solely for illustrating the operation of the CO_2/silicate process for hardening foundry sands. The basic materials for the operation of the process are dry silica sand, sodium-silicate solution (112 deg. Twaddle) and carbon dioxide. The film shows the entire procedure for mould and core making with special emphasis on the CO_2 technique where this differs from traditional practice. A pocket-sized descriptive booklet illustrated by "stills" from the film will be available for distribution to audiences.

An Imposing Mural

An outstanding feature of the magnificent new headquarters of C. C. Wakefield & Company, Limited, at Castrol House, Marylebone Road, London, N.W.1, is the 50 by 24 ft. mural consisting of an aggregation of aluminium castings, shown in this illustration. The black lines across the illustration represent a stairway serving the mezzanine floor. The mural is the work of Mr. Geoffrey Clarke, A.R.C.A., and the panels were cast by the artist himself with the aid of two assistants at his studio in Suffolk. It is understood that the method used was to draw the design direct on to the sand bed and no patterns were used, although, of course, a small model of the mural was first prepared. For his motif, the designer made use of primitive symbols to portray his subject—"The Story of Lubricating Oil." The total weight of the mural is between 3½ and 4 tons. From the foundry point of view, the castings are devoid of craftsmanship, but the finished picture is at least imposing. (Note: the explanatory inscriptions were added to the photograph and do not appear on the mural).



Company News

F. W. BERK & COMPANY, LIMITED, chemical manufacturers, bonding clay specialists, of London, W.1—In view of recent Press reports, the board announces that no offer has been made and no negotiations are in progress for the purchase of the company's capital.

IMPERIAL ALUMINIUM COMPANY, LIMITED—The company, a subsidiary of Imperial Chemical Industries, Limited, has acquired the 69,400 ordinary £1 shares of Invicta Foil & Cheswright & Nicholls, Limited, an exempt private company manufacturing aluminium foil at Barking (Essex).

NORTON INDUSTRIES, LIMITED, ironfounders, engineers, etc., of Wolverhampton—With an unchanged final payment of 15 per cent., the dividend is held at 20 per cent., plus a tax free capital dividend of 13 $\frac{13}{44}$ per cent. (nil). Group profits for the year ended October 31 were £87,535 (£52,601), after tax of £84,045 (£48,122).

ATLAS COPCO AB—Net profit for 1959 was £558,043, against £489,149 in 1958 and the dividend of 10 per cent. is repeated plus a bonus of 2 per cent. (nil). The board proposes to increase the capital from £3,375,818 to £4,340,337 by transferring £964,519 from the appropriation account and making a two-for-seven scrip issue.

MATHER & PLATT, LIMITED, electrical and textile engineers, etc., of Manchester—Consolidated trading profits recovered from £1,435,344 to £1,522,972 in 1959, and the year's dividend is brought up to 11 per cent. with a final of 8 per cent., comparing with the previous equivalent of 10$\frac{1}{2}$ per cent. There was a one-for-two scrip issue in 1958.

NEWMAN, HENDER & COMPANY, LIMITED, foundrymen, etc., of Stroud (Glos)—Under the rights offer of 753,239 ordinary 10s. shares, holders took up 749,194 shares. Applications for 171,999 additional shares were received for the 4,045 shares available. In the allotment of these, preference was given to the smaller applications on a scaled-down basis.

C.V.A. JIGS, MOULDS & TOOLS, LIMITED—It is proposed to change the company's name to Kearney & Trecker-C.V.A., Limited. The board expects that the addition of Kearney's name will assist overseas sales. The chairman, Sir John Eldridge, says that the recession affecting the machine-tool industry appears to have abated and there are signs of an increasing demand for the group's products.

WILMER LEA FOUNDRIES (HOLDINGS), LIMITED—The board has been informed that it will shortly receive a formal offer from Charles Karen & Son (Holdings), Limited, to buy the company's 3,000,000 1s. shares at 9d. a share in cash. The deal will involve £112,500. The directors intend to accept in respect of their own holdings and to recommend other holders to do likewise, subject to agreement on details.

INTERNATIONAL HARVESTER COMPANY OF GT. BRITAIN, LIMITED—At the end of the first quarter of the fiscal year, the company reports sales 56 per cent. ahead of the same period last year, mostly accounted for by greatly increased export sales, affecting both of the company's main product groups. Crawler tractors and construction equipment are, overall, 70 per cent. ahead of the same period of the record 1959 year, while export figures for crawler tractors alone show a 200 per cent. gain.

WEBLEY & SCOTT, LIMITED, engineers and machinists, of Birmingham—After considering the accounts of Arusha Industries, Limited, for the 15 months to September 30, 1959, and those for the six months to the same date of Webley & Scott, the Shareholders' Committee advises Webley holders to accept the Arusha offer for the shares. Members are told that although the committee is still not satisfied that acceptance is in the best interests of holders, it feels that there is no more to be gained by remaining as minority shareholders and therefore recommends acceptance of the Arusha offer.

ENGLISH CHINA CLAYS, LIMITED—The directors expect to maintain the present rate of dividend at 8$\frac{1}{4}$ per cent., tax free, for the current year on the capital increased by the recently proposed one-for-five scrip issue. During the year ended September 30 the level of china clay sales exceeded the record 1957 figure by about 7 per cent., establishing a new record for the clay division. Exports have again increased during the year, due, to a certain extent, says the chairman (Sir John Keay), to easier sea freights, a factor upon which the effectiveness of the company's ability to compete depends. Deliveries in the home market have shown a welcome increase, he says.

W. H. DORMAN & COMPANY, LIMITED, manufacturing engineers, etc., of Stafford—The company is resuming interim dividends with a declaration of 2d. per 2s. ordinary share, or 8$\frac{1}{3}$ per cent., on account of the year ending March 31, 1960, and forecasts at least a similar final. A single payment of 2d. per ordinary was made for the previous year. The last interim was in respect of 1956-57. The company reports that in the calendar year just ended as many engines were sold as in the previous two years combined. This allows the directors to look forward with confidence to a recovery in the final profit figure for the year ending next month. It is anticipated that the net profit, subject to tax, will not be less than £140,000, in which event it would be the directors' intention to recommend a final dividend no smaller than the interim payment now announced.

ALFRED HERBERT, LIMITED, machine-tool makers, of Coventry—Although group net profits dropped to £1,354,253 (£1,531,552) in the year ended October 31, 1959, the chairman, Col. C. W. Clark, states that in view of the more favourable position, the final dividend is raised to 5 (4) per cent. This makes 7 (6) per cent., tax free, for the year. There is in addition a capital distribution of $\frac{1}{2}$ per cent. (nil) from realized capital profits. Improved demand accelerated throughout the year and profits are somewhat better than was expected a year ago. Monthly average value of orders received in the first quarter of the current financial year exceed the monthly average of orders for the previous 12 months by 32 per cent.; value of orders received in the first quarter was higher than that of any three-month period in the last four years.

JOHN FOWLER & COMPANY (LEEDS), LIMITED, manufacturers of tractors and locomotives, etc.—The chairman, Mr. A. Carr, said that improved sales in the locomotive division were being sought now that the company has made models covering a wider range. The board felt that the decision to bring this division up to date would ultimately benefit its trading, although keen world competition must not be overlooked. In the heavy crawler-tractor field, world competition was again increasingly severe and the profit margin was very lean, even though a substantial export order had recently been secured. Signs of further overseas business were apparent and every effort was being made to bring these prospects to finality in the current year. But because of international trading difficulties, it was impossible to forecast the possible results.

ISI Translations

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

1477 HYDRODYNAMICS OF MOLTEN STEEL WHEN TEEMING. II. Koike, Y. *Tetsu to Hagane*, 1958, March, pp. 260-262 (£4 15s.) Results are given for the effects of length and shape of nozzle and of increase in diameter at the nozzle outlet on the "safety-limit of stopper lift," *viz.* the minimum lift where dropwise flow changes to laminar flow at constant head. (Abstract *JISI*, 1959, August, p. 389c.)

1532 MELTING IN ELECTRIC FURNACES. Hajek, M. *Slévárenství* (Prague), 1958 (12), pp. 384-390. (£5 10s.) The technological and economic scope of the use of electric furnaces in foundries casting steel, grey cast-iron and non-ferrous metals are analyzed. While prower and extensive use of arc furnaces is made in steel foundries, such furnaces are used less and less efficiently in foundries casting grey cast-iron and non-ferrous metals. The decisive factors in deciding for or against the use of arc furnaces in grey-iron foundries are shown to be the ratio of the prices of current and coke, and the amount of cheap scrap locally available. Various types of furnaces are illustrated and the technology of melting grey cast-iron in them is discussed. (Abstract *JISI*, 1959, September, p. 86c.)

1538 EFFECT OF STEEL COMPOSITION ON HOT-TEARING IN CASTINGS. Trubitsyn, N. A., and P. N. Bidulya. *Lit. Proizv.*, 1958 (6), pp. 22-26. (£5 15s.) Internal and external factors leading to the defect were examined with special reference to composition. Test heats of steels with C 0.05-0.1, Si 0.1-0.2, Mn 0.2-0.3, P 0.015 and S 0.03 per cent deoxidized in the ladle with Al were poured and shrinkage was measured by means of a special device. Fluidity tests were also carried out. The temperature and compositions favouring hot tears were observed. (Abstract preprinted from *JISI*.)

Translations in course of preparation include:—

1601 BASIC ROOFS FOR HEAVY-DUTY FURNACES. Hutter, L. *Redex Rund.*, 1959 (5), pp. 629-639.

1608 POROSITY IN STEEL CASTINGS. Wlodawer, R. *Giesserei* 1960, January 14, pp. 1-7.

1621 DETERMINATION OF THE OPERATING CONDITIONS OF STEEL WORKS' CRANES AND CHECKING THE BASIS FOR SELECTING THE DIMENSIONS. Svenson, O., and W. Schweer. *Stahl u Eisen*, 1960, January 21, pp. 79-90.

The following translation is now available from Mr. H. Brutcher, P.O. Box 157, Altadena, California, USA:—

HB 4735 STUDY OF HEAT-TRANSFER IN MOULDS OF CONTINUOUS CASTING MACHINES FOR STEEL. Akimenko, A. D., and A. A. Skvortsov. *Izv. VUZ.-Chern. Met.*, 1958, December, 45-50

For the translations listed below inquiries should be made to the Department of Scientific and Industrial Research, 20, Chester Terrace, London, N.W.1, quoting the reference number:—

DSIR C.T.S. 93 INFLUENCE OF THE TEMPERATURE UPON THE SPEED OF CORROSION OF ALUMINIUM AND SOME ALUMINIUM ALLOYS. Akimov, G. V. *Dokl. Akad. Nauk SSSR*, 1953, *91* (2), pp. 281-83.

DSIR C.T.S. 175 SPECIAL ASPECTS OF THE PRODUCTION OF HEAT-RESISTANT CASTINGS. Deshitskii, V. P. *Lit. Proizv.*, 1955 (6), pp. 1-4.

DSIR M. 636 EFFECT OF ULTRASONIC VIBRATIONS ON THE AGING OF DIFFERENT GRADES OF DURALUMIN. Gorskii, F. K., and U. I. Efremov. (Abstract.) *Izv. Akad. Nauk. BSSR* 1953 (3).

DSIR RTS 1239 THE FORMATION OF BURN-ON STEEL CASTINGS. Gulyaev, B. B., and Yu. F. Borovskii. *Lit. Proizv.*, 1957 (6), pp. 5-7.

DSIR C.T.S. 153 THE STRENGTH OF CAST IRON WITH NODULAR GRAPHITE. Kudryavtsev, I. V., and N. B. Baranova. *Lit. Proizv.*, 1954 (9), pp. 6-10.

DSIR C.T.S. 81 NEW PRINCIPLE IN THE INVESTIGATION OF ATMOSPHERIC CORROSION OF METALS. Rozenfel'd, I. L., and T. I. Pavlutskay. *Dokl. Akad. Nauk, SSSR*, 1953, *91* (2), pp. 315-17.

DSIR C.T.S. 133 COATINGS FOR PATTERNS. Saitsev, D. G. *Lit. Proizv.*, 1954 (6), p. 31.

News from South Africa

Electric Furnaces in West Rand Foundry

Two Russ furnaces of the mains-frequency coreless-induction-type are now in operation at the works of Central Brass & Iron Foundry, Limited, Roodepoort, Johannesburg. The furnaces, which have a capacity of 2½ tons each and a melting rate of 1,400 lb. cast iron per hr., are the first to be imported into South Africa for the production of spheroidal-graphite cast iron. A five-ton electric-arc furnace is also on order and will be installed later this year.

Compressed-air in South African Foundries

The following information is taken from a review of the use of compressed air in South African foundries issued on behalf of the Atlas Copco concern:

One of the best known and largest foundries in South Africa is the Vaal works of the Union Steel Corporation, Limited ("Usco"). These vast corrugated-iron shops are a landmark in Vereeniging, on one of the main outlets to the fast-growing Orange Free State goldfields. From these works have come some of the biggest steel castings ever poured in South Africa. Here, the most important consuming industry is mining, for which Usco makes manganese-steel liners for crushers, the main frames for cone- and jaw-crushers, hoist-drum cheeks and shells, and many other castings.

Some idea of how Usco has developed since the war can be gained from the fact that in only 11 years the output of the Vaal works compressed-air station has been doubled twice and is now 9,000 cub. ft. per min. The air is used to operate the doors of annealing ovens, four jolt/roll-over machines (with capacities of one and two tons), and numerous compressed air-operated tools including chipping hammers, grinders, mucking-off hammers for removing sand and cores, and sand rammers. The two-ton jolt/roll-over machine is operated entirely by compressed air. Moulding sand is placed around the pattern in the moulding box, which is jolted by the machine, and then tamped with a pneumatic rammer. Surplus sand is removed and compressed-air lifts the box into position against a steel plate mounted on the machine, which turns it through 180 deg. and vibrates it to loosen the pattern. This operation complete, the clamping plate is removed and the pattern stripped.

By way of contrast is Apex Foundry (Pty.), Limited. Considerably smaller but quite impressive, this foundry is situated in one of Vereeniging's newest industrial suburbs. Apex are jobbing founders in brass, aluminium and cast iron, engaged mostly in maintenance work for the mines, the South African Iron & Steel Corporation, the Van der Bijl Engineering Corporation and the African Metals Corporation. Castings produced by this expanding foundry, which was only started nine years ago, include mill-guides for the coupling boxes and breaker pads for the Usco rolling mill (a cast-iron breaker pad is a safety device which will break if the steel passing through rolling mills is too cold). This foundry also makes pig moulds weighing 2½ cwt. each for the South African Iron and Steel Corporation, spun-cast brass bore-hole-fittings, rings for valves and rifle nuts for rock-drills, and aluminium patterns for the Van der Bijl Engineering Corporation. It is equipped to produce castings of up to six tons and compressed air is used here for shotblasting, various tools, an air-operated hot-saw and one jolt/roll-over moulding machine.

News in Brief

THIS YEAR the annual banquet of the Joint Iron Council will be held in the Guildhall, London, on November 1.

C. J. R. ELECTRICAL AND ELECTRONIC DEVELOPMENTS, LIMITED, Bickford Road, Witton, Birmingham, 6, have changed their name to Witton Electronics, Limited.

FIRTH VICKERS SPORTS CLUB, who have been members of the Sheffield Works Sports Association for only three years, received a plaque on February 18 for winning the Tennis League of the Association for the third year in succession.

WHARTON CRANE & HOIST COMPANY, LIMITED, of Reddish, Stockport, has secured an order worth over £300,000 for overhead-travelling cranes to be supplied to Richard Thomas & Baldwin's new steel-rolling mill at Llanwern, near Newport.

A FIRE which destroyed part of a timber roof at the brass foundry of Norfolk Metals, Limited, Effingham Road, Attercliffe, Sheffield, on February 22, is thought to have been started by sparks from the crucible. No major interruption to business is expected.

ORDERS FOR ELECTRICAL EQUIPMENT worth nearly £2,250,000 have been placed with the General Electric Company, Limited, Witton, Birmingham, by Richard Thomas & Baldwins, Limited, for their new Spencer Works at Llanwern, near Newport, Monmouthshire.

A CONTRACT, valued at £10,000, has been secured against tender by Griffin & George, Limited, Ealing Road, Alperton, Middlesex, to supply the scientific equipment for the laboratories of the new Mid-Hertfordshire College of Further Education at Welwyn Garden City, Herts.

THE SHROPSHIRE BRANCH of the Institute of Industrial Supervisors paid a visit to the works of the Bilston Foundries, Limited, at Highfields, Bilston, on February 23. On March 8, the Wednesbury and Darlaston branch of the Institute is to visit the works of Stewarts and Lloyds, Limited, at Bilston.

PHILATELISTS AMONGST IRONFOUNDERS may be interested to know that the postal authorities in the Netherlands Antilles have produced postage stamps embodying an illustration of the sea-water distillation plant, installed at Aruba in the Dutch West Indies, which incorporates many large iron castings made in the Scottish foundry of G. & J. Weir, Limited, Glasgow.

NEARLY 250 MEN engaged in the production of castings at the Chapeltown foundry of F. Parramore & Sons, Limited, returned to work on Friday, February 26, after a dispute which started the previous Wednesday, over methods of working. The men were told that the management had agreed to bi-monthly meetings with union officials to review the position.

THE RENFREW FIRM of Simons-Lobnitz, Limited, have secured, in face of keen British and overseas competition, an order for a su-tion dredger for John Holt Westminster Dredging. It is reported that it will be one of the biggest for cutting and clearing silt by suction, and it is the fourth dredger to be ordered from Clydeside firms during the past 10 weeks.

WOODALL-DUCKHAM CONSTRUCTION COMPANY, LIMITED, main constructing company of the Woodall-Duckham group, has contracted to purchase the whole of the issued share capital of Ames Crosta Mills & Company, Limited, sewage-purification engineers, of Heywood, Lancashire, for the cash sum of £735,000. Plans are in hand to extend the activities of Ames Crosta Mills in the fields of sewage purification and effluent treatment on a world-wide scale.

ROLLS-ROYCE, LIMITED, Derby, have received from United Air Lines of Chicago an order worth £3,300,000 for Avon jet engines—one of the largest single orders ever placed in Britain by an American air line. The engines are for installation in a fleet of 20 French-built Caravelle air liners, and are similar to those used in the Comet IV. After the first 12 months operation of Avon-powered Comet IVs Rolls-Royce announced that there had not been a single case of engine failure leading to loss of power in flight.

THE IRON TRADES EMPLOYERS' INSURANCE ASSOCIATION, LIMITED, has appealed against the refusal of Sheffield City Council to permit erection of offices at the junction of Clarkehouse Road and Clarkegrove Road. Permission was refused because the area is allocated for residential purposes in Sheffield Development Plan, and the Council also considered traffic difficulties would be created. The Minister of Housing and Local Government has ordered a public inquiry on the Association's appeal.

PLANS ARE IN HAND for an 88,000 sq. ft. extension to the factory of Hoover, Limited, at Cambuslang, Lanarkshire. About 1,700 workers are employed at the factory at present and it is expected that the new development will provide work for a further 300. Equipment and tooling of the new extension, which will be highly mechanized, will cost about £400,000. Mr. C. J. Hodges, works manager at Cambuslang for the past nine years, has been appointed a director of the firm, as has Mr. D. H. Vigers, secretary of the company.

A PARTY of 40 members of the London branch of the Institution of Heating & Ventilating Engineers, led by Mr. R. F. Gillham of Smeaton & Sons, Limited, heating engineers, visited the principal works of Keith Blackman, Limited, at Tottenham on February 20. After being welcomed by Mr. C. J. Atkins, sales director, the visitors were grouped in parties of eight and escorted on a tour of the works which led them into the various research departments, the power-house, the acoustics laboratory (the first of its kind in the country), test bed and balancing shop.

Mr. W. D. PUGH, managing director, English Steel Corporation, Limited, Sheffield, presented trophies at the firm's sports club dinner on February 26. Dr. C. J. Dadswell, a director, said that the firm, which had increased its staff by over 300 in the past 18 months, still needed 300 more workers. He added that employees now had an extra two hours' leisure as a result of the recent agreement between employers and the unions, which cut down the working week to 42 hours, and he hoped that use would be made of this, especially in the sports club, for the good of health.

TO COPE with the pressure of increasing sales and technical enquiries, West Instrument, Limited, of Brighton, Sussex, manufacturers of temperature indicating and controlling equipment, have opened a new sales and service department in Sheffield. The manager of the new office at White Buildings, Fitzalan Square, Sheffield, 1, is Mr. I. Wylie. The company has also made additions to its representatives at the London, Birmingham and Manchester offices as follow:—Mr. R. W. Newland (Manchester), Mr. G. J. Carmichael (Birmingham), and Mr. D. A. Goswell (London).

THE LARGEST ROLLING MILL of its type in Western Europe has been ordered by James Booth Aluminium, Limited, as the first part of its £5,000,000 re-equipment and expansion programme. It is expected to be in operation in the company's Kitts Green Works, Birmingham, during 1961. The mechanical side of the new

plant, costing approximately £1,500,000, has been ordered from Loewy Engineering Company, Limited (Bournemouth), and is designed to roll aluminium and Duralumin slab ingots weighing up to 6 tons, for the production of plate, sheet and strip. Included in the plant is a reversing 4-high hot mill 148-in. wide.

CUSTOMERS OF THE COMPANY were guests of the John Thompson Ordnance Company, one of the John Thompson group, at Ettingshall, Wolverhampton, on February 24 when they saw something of the design and engineering work of nuclear power-station construction. Strict manufacturing conditions obtain for the high-precision equipment which the company is making for the charge faces of two nuclear power-station reactors at Berkeley, and much of the final assembly work is done in "clean areas" walled with polythene sheeting to conform to the necessary cleanliness. The machinery for the charging faces has to be completely reliable, for, once it is in use, its working parts are inaccessible: they become highly radio-active and thus cannot be manually maintained. Great accuracy is also involved. In the charge-face machines the shute must be able to select one of a possible 3,000 fuel channels in the reactor at a distance of 40 ft. and to an accuracy of 0.22 in.

Obituary

The death has occurred of Mr. ALBERT WILLIAM LESTER, managing director of Walsall District Iron Company. He was 82.

Mr. HENRY GIBSON WHITEHURST, chief chemist at Darwins, Limited, Sheffield, was killed in a motor-car accident on the night of February 19.

The death is reported of Mr. JOHN WILLIAM WOOD, managing director of the Uskside Engineering Company, Limited, engineers and forgemasters, Newport, Mon.

Mr. G. R. WOODWARD, manager of the information department of the British Cast Iron Research Association, died last Friday at the age of 51 after a long illness. He joined the Association in October, 1934, as librarian, and was appointed to the information department in 1946. (Mr. Woodward was very well known in foundry circles and an appreciation of his services to the industry will be printed in next week's JOURNAL.)

One of the leading members of the Midland brass-foundry industry, Mr. JOHN JEWSBURY, died on February 27 at the age of 77. He was chairman of Pearson, Page, Jewsbury & Company, Limited, the firm founded in 1884 by his father who was also named "John." Mr. Jewsbury was a founder member of the reproduction section of the National Brass-founders' Association of which his younger son, Mr. C. A. Jewsbury, managing director of the firm, is the present chairman.

The death is announced of Mr. CHARLES COOPER, who served on the editorial staff of *Engineering* for 60 years—except for three during the first world war when he was in charge of one of the early wind-tunnels. He left school at the age of 14 and by evening study, matriculated and later gained a B.SC. degree. He was joint editor with Mr. J. Foster Petree from 1939 to 1953—a difficult period which undermined his health. Though he resigned from doing day-to-day work, he continued to be in touch with the journal until a few months ago.

NSMP Notes

The National Society of Master Patternmakers are holding a technical meeting and dinner on March 22 at the Metropole Hotel, Leeds. The speaker at the meeting, which commences at 6 p.m., is to be Mr. H. G. C. King (of British Railways' Eastleigh), who will present his paper on "An Introduction to Patternmaking in Plastics," mainly for the benefit of Midlands and Northern-area members. The meeting will be followed at 8.15 p.m. by a dinner for members, the cost of which is 21s. exclusive of wines.

Annual Dinner/Dance

This year's annual dinner/dance of the Society is to be held on May 21 at the Grand Hotel, Brighton. Members wishing to attend are asked to remit to the Society a participation fee of 21s. and to book their hotel accommodation themselves if this is required.

Those wishing to participate in either or both the above events, are asked to write immediately to the NSMP secretaries, Fisher and Firkins, 12, Cherry Street, Birmingham, 2.

Another Golden Jubilee

June this year marks the Golden Jubilee of the establishment of the well-known steel foundry of Lake & Elliot, Limited, of Braintree. At the time of the firm's debut the senior executive was the late Mr. W. B. Lake, J.P., a veritable pioneer. He was the first man in Essex to drive a motor car and the first to use an electric-arc melting furnace to melt metal for steel castings. The firm was in the news last week as, following tradition, each of the 1,000 employees was given two newly-minted halfcrowns with which to toast the health of the new Prince. (A similar gift had been made to recognize the arrival of the Prince of Wales and Princess Anne). The present managing director, Mr. C. H. Kain, is to be the next president of the British Steel Founders' Association, having recently relinquished the chair of the British Steel Castings Research Association. Under his guidance, the progressive spirit evinced by the late Mr. W. B. Lake is being and will continue to be shown.

MI/Lancashire Dynamo offer closed

At the extended closing date (February 19) of its offer for the capital of Lancashire Dynamo Holdings, Limited, Metal Industries, Limited, had acquired £2,806,269 ordinary, or 96½ per cent. of the total in issue, and £530,070 5½ per cent. cumulative preference—94½ per cent. The closing date will not be extended again, but all outstanding stock will be acquired compulsorily.

Assuming these arrangements are duly completed, and subject to the extra-ordinary and special resolutions being duly passed at meetings to be held on March 3, the issued share capital of Metal Industries will total £8,761,758, comprising £1,212,000 in 5 per cent. cumulative preference, £1,560,000 in 3½ per cent. cumulative preference, and £5,989,758 in ordinary shares.

DISTINGTON ENGINEERING COMPANY, LIMITED, of Workington, had an output for the week ended February 20 of 2,520 tons of ingot-moulds, bottom-plates, slag-ladles and general engineering castings. The foundry, it is claimed, thus becomes the first ingot-mould foundry in Europe to produce more than 2,500 tons of finished castings in one week. The week's output of ingot moulds totalled 439, the highest in the history of the works, which was established in 1946.

Book Reviews

Praktische Ratschläge für den Giesserei-Fachmann. (Practical Points for the Foundryman), by F. Naumann. Published (in German) by Fachverlag Schiele & Schön GmbH., Markgrafenstrasse 11, Berlin, S.W.61; price DM. 7.50 (about 12s.).

This book, in its second edition (1959), contains in 110 pages a selection of 50 examples taken from the everyday practice of foundrywork. The author has chosen such types of jobbing work which occasionally create unexpected difficulties, even to the experienced and knowledgeable foundryman, and for this reason frequently cause wasters. No fewer than 139 illustrations accompany the examples discussed, including cases of castings which became faulty as the result of carelessness or thoughtlessness, where proper attention and care in their manufacture would have produced serviceable castings.

The author then gives some practical information regarding foundry expedients which are used when it becomes necessary to extricate oneself in a safe and preferably simple manner from some difficult situation encountered in moulding, coremaking, coring up, etc. He further explains with particular clearness of expression some of the more unusual types of practical work arising in an ordinary foundry mainly dealing with sand castings, such as the casting-in of tubes or of round bars, the use of iron-cores, the application of chills and denseners and the precautions necessary when casting large pulley-wheels in sections. Finally, the three main kinds of scabs, mould scabs, core scabs, and scabs caused by blackings are discussed.

This is an inexpensive paper-backed book which ought to be in the hands of every foundry apprentice capable of reading German. Experienced foundrymen, too, will often find valuable practical advice in appropriate language and illustrated by photographs taken on the foundry floor.

O. P. EINERL.

The Foundry Workers—a Trade-Union History, by H. J. Fyrth, B.SC.(ECON.), and Henry Collings, M.A., D.PHIL. Published by the Amalgamated Union of Foundry Workers, 164, Chorlton Road, Manchester, 16; price 18s., plus postage (UK 1s. 3d.).

This book is a connected account of the beginnings and development of the trade unions serving the foundry industry from the creation of the Friendly Iron Moulders' Society in 1809. The authors, for some years, have been lecturers at the summer school organized by the Amalgamated Union of Foundry Workers.

On page 141, the following remark appears, "Cuthbert Laws, who represented the Shipping Federation, made the customary employers' speech in moving the resolution": the reviewer's opinion is that this book reflects the *customary outlook* of left-wing socialists. Once this is recognized, anyone interested in foundrywork will enjoy reading it.

The first chapter, dealing with the early history of founding, is entitled "The Moulder's Art" and is well written and authentic. The next chapter covers the period 1809 to 1846. It marks the beginning of trade unionism in both England and Scotland. At this period, unions were essentially craft associations based on mutual aid, where sickness, old age and funerals caused hardship. This period ended with a movement towards the centralization of activities. The next covered is from 1846 to 1883—the "Golden Age of Victorian Prosperity"—which was also the period when the use of castings in engineering and architecture was paramount. From 1853 to 1875, fewer than 5 per cent. of the members of the trade union were out of work. Notes are included on internal dissensions, inherent in many organizations, some of which still persist. The inefficiency of various secretaries is recorded and comes into prominence later when the union became an approved society under the National Insurance Act of 1911. It seems that a working moulder does not make a very good bookkeeper. (The numerous bankruptcies between the two wars amongst moulders who became foundry owners reinforces this belief and also the reviewer's opinion that a knowledge of costing should be included in the training of all foundry apprentices.)

In general, the period 1884 to 1914 did show slow but sure progress towards better working conditions, and further advances—more progress with some setbacks—are recorded for the 1920 to 1939 period. For the post-war period, the authors devote much space to the Garrett Report—which was actually the "brain child" of the late Mr. Tom Makemson. In its final form, it was the result of joint effort by foundry employers and the trade unions, and as such was welcomed by leaders of thought in both parties.

This book is essentially readable though marred by a few misprints, for example, "Lobitz" for "Lobnitz" and T. W. Gardom for J. W. Gardom. It should be read by all those having to deal with trade unions, as they will gain a better insight as to their background and ways of thinking about industrial matters. Often they are more conservative than the "bosses"! After reading of all the trials and tribulations of the moulder over so many decades, there seems justification in reasserting "They have never had it so good" as to-day, the credit for which is obviously due to the enlightened policies followed by the leaders of both sides of the industry.

V. C. FAULKNER.

Kempe's Engineers Year-book, 1960. Published in two volumes in a case by Morgan Brothers (Publishers), Limited, 22, Essex Street, Strand, London, W.C.2; price 90s., post free.

The great value of this well-known and highly-appreciated compendium of engineering facts is the meticulous indexing which runs to no fewer than 120 pages. In the course of time, all engineers are called upon to carry out projects just beyond their normal activities or to deal with new developments, and this is where a work of reference such as this becomes invaluable. This edition carries entirely new sections dealing with electronic engineering; nuclear power; prestressed concrete; diesel locomotives; railway brakes and naval architecture. The excellent section on foundry work is of course retained.

FBI Register of British Manufacturers 1960, 32nd Edition. Published for the Federation of British Industries by Kelly's Directories, Limited, and Iliffe & Sons, Limited, Dorset House, Stamford Street, London, S.E.1; price 42s. post free.

This well-known directory services the members of the Federation of British Industries by publishing a list of their products, assigning to each class a number which corresponds to the number of that class in the multi-language section. The addresses of the members' firms are listed and those of the trade associations affiliated to the FBI. It is well recognized that this directory is much appreciated by overseas buyers when looking for British sources of supply.

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Pig-iron and Steel Production

Statistical Summary of December Returns

The following particulars of pig-iron and steel produced in Great Britain are from statistics issued by the British Iron and Steel Federation. Table 1 summarizes activities during recent months. Table 2 gives production of steel ingots and castings in December. Table 3, weekly average production of finished steel in November. Table 4 gives the production of pig-iron and ferro-alloys in December, and furnaces in blast. (All figures are weekly averages in thousands of tons).

TABLE 1.—*Iron and Steel Index and General Summary of Pig-iron and Steel Production.*

Period.	B.o.T. Price Index, 1938 = 100.			Iron-ore output.	Imported ore used.	Coke sent to blast-furnaces.	Pig-iron, ferro-alloys prod.	Scrap used in steel prod.	Steel (incl. alloy).			
	Iron and steel.	Coal.	Basic materials						Imports.[1]	Prod. ingots, castings.	Delivrs. finished steel.	Stocks.[2]
1957	328	488	537	325	303	270	275	220	14	417	322	2,580
1958	343	403	478	276	262	227	245	196	9	369	284	2,242
1959—Oct. ..	339	504	480	299	283	228	270	235	7	441	336	2,207
Nov. ..	339	504	483	299	291	234	277	247	9	459	348	2,195
Dec. ..	339	504	485	303	293	248	280	225	9	433	312	2,235

TABLE 2.—*Average Weekly Production of Steel Ingots and Castings in December, 1959.*

District.	Open-hearth.		Bessemer.	Electric.	All other.	Total.		Total ingots and castings.
	Acid.	Basic.				Ingots.	Castings.	
Derbys., Leics., Notts., Northants., and Essex ..	—	4.7	16.2 (basic)	2.5	—	22.0	1.4	23.4
Lancs. (excl. N.W.Coast), Denbighs., Flints., Ches. Yorks. (excl. N.E. Coast and Sheffield)	0.9	33.1	—	4.4	0.3	37.4	1.3	38.7
Lincs.	—	47.4	—	—	0.1	47.4	0.1	47.5
North-East Coast	0.9	87.9	—	1.2	0.3	88.8	1.5	90.3
Scotland	1.0	43.5	—	2.7	—	45.3	1.9	47.2
Staffs., Shrops., Worcs., and Warwicks.	—	21.1	—	3.7	0.8	23.8	1.8	25.6
S. Wales and Monmouthshire	1.7	85.2	14.2 (basic)	0.8	0.1	101.6	0.4	102.0
Sheffield (incl. small tonnage in Manchester) ..	6.7	31.8	—	12.7	0.3	49.7	1.8	51.5
North-West Coast	—	—	6.0 (acid)	0.6	0.1	6.6	0.1	6.7
Total	11.2	354.7	36.4	28.6	2.0	422.6	10.3	432.9
November, 1959	14.1	377.1	33.3	32.0	2.1	447.6	11.0	458.6
December, 1958[3]	9.7	263.7	19.2	18.8	1.7	304.5	8.6	313.1

TABLE 3.—*Deliveries of New Non-alloy and Alloy Finished Steel*

Product.	1957.	1958.	1958.	1959.	
			Nov.	Oct.	Nov.
Non-alloy steel:					
Ingots, blooms, billets, and slabs[4]	5.0	4.6	5.7	4.9	6.6
Heavy rails ..	11.2	10.2	11.2	6.4	6.2
Sleepers	1.3	1.2	2.7	0.3	0.2
Fish-and soleplates	0.8	0.7	0.3	0.5	0.2
Plates (i) Over ¼ in.	34.0	29.6	25.8	29.3	28.7
(ii) Under ¼ in. ..	20.3	17.7	18.2	20.3	20.7
Other heavy prod.	53.0	41.8	31.7	51.5	53.9
Ferro-concrete bars	8.9	7.6	7.5	11.7	12.2
Wire rods ..	23.3	21.5	24.4	27.9	28.0
Arches, etc. ..	11.0	8.6	7.9	7.6	7.3
Other light sections	38.7	29.1	29.4	39.5	40.8
Bright steel bars ..	7.0	6.2	6.5	9.1	9.4
Hot-rolled strip ..	23.1	22.6	24.5	31.3	32.9
Cold-rolled strip ..	7.1	7.0	7.3	9.7	9.9
Sheets, incl. coated:					
(i) Hot-rolled ..	13.0	10.6	9.9	13.8	13.8
(ii) Cold reduced	29.1	31.1	35.2	39.4	38.4
Tinplate	12.8	18.7	22.1	21.3	23.5
Blackplate	1.0	0.8	0.8	0.8	0.9
Tubes up to 16 in.	22.1	19.0	20.9	25.4	26.2
Tube fittings, etc. ..	0.5	0.4	0.4	0.5	0.5
Tyres, wheels, axles	5.1	4.5	3.8	2.0	3.3
Forgings (excl. drop)	3.1	2.6	2.4	2.2	2.3
Steel castings ..	4.6	4.2	3.9	3.8	4.1
Tool steel, etc. ..	0.3	0.2	0.2	0.5	0.3
Total	342.3	300.5	302.7	359.7	370.3
Alloy steel	17.8	16.1	15.0	21.7	22.7
UK production[5] ..	360.1	316.6	317.7	381.4	393.0
Add: Imported finished steel ..	9.6	7.1	5.5	7.8	9.6
	369.7	323.7	323.2	389.2	402.6
Deduct: Intra-industry conversion[6] ..	48.2	41.2	42.9	54.4	55.8
Total new material ..	321.5	282.5	280.3	334.8	346.8

TABLE 4.—*Production of Pig-iron and Ferro-alloys*

District.	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total
Derbys., Leics., Notts., Northants., and Essex	18	—	24.4	21.6	0.8	—	46.8
Lancs. (excl N.W. Coast), Denbighs., Flints., and Ches. .. Yorks. (excl. N.E. Coast and Sheffield)	6	—	19.1	—	—	1.0	20.1
Lincs.	10	—	43.0	—	—	—	43.0
North-East Coast	16	1.8	58.4	—	—	—	60.2
Scotland ..	6	0.9	17.5	0.9	—	—	19.3
Staffs., Shrops., Worcs. and Warwicks. ..	5	—	8.7	0.9	—	—	9.6
S. Wales and Monmouthshire	10	2.5	55.4	1.3	—	—	59.2
Sheffield	2	—	3.4	—	—	—	3.4
North-West Coast	8	15.8	0.9	1.0	—	1.1	18.8
Total ..	81	21.0	230.8	25.7	0.8	2.1	280.4[6]
November, 1959 ..	78	22.9	228.3	23.3	0.7	2.1	277.3
December, 1958[3]	84	20.4	177.3	22.9	0.1	2.4	223.1

[1] Weekly average of calendar month.

[2] Stocks, mainly ingots and semi-finished, at the end of the year and months shown.

[3] Five weeks, all tables.

[4] Other than for conversion into any other form of finished steel listed.

[5] Includes finished steel produced in the UK from imported ingots and semi-finished steel.

[6] Material for conversion into other products also listed in this table

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Raw Material Markets

Iron and Steel

Continued expansion in demand for pig-iron is reflected in the rising outputs at the blast furnaces, which are now producing at record figures. For most grades of pig-iron the call for supplies is much higher than it has been for some time past, and this applies particularly to basic pig-iron, which the steelworks are now taking up in much bigger tonnages. The shortage of scrap has also necessitated a larger proportion of pig-iron in their mixtures, and this has brought a further expansion in their requirements.

As for some time past, the demand for pig-iron from the ironfoundries is comparatively much heavier for the low-phosphorus irons than that being made for other grades, and the engineering and speciality foundries are consuming substantial quantities for the production of high-duty castings. Most of these foundries and particularly those supplying castings to the motor-vehicle trade are working at full capacity. Their demands for hematite pig-iron are also much heavier, and those foundries requiring refined irons are also specifying more freely for supplies. For all of these irons there is now much more forward buying, as consumers are anxious to cover adequately for sufficient supplies to fulfil their heavy order-books.

Fortunately, the wider range of makes of low-phosphorus irons which the foundries are now able to obtain has eased the supply position considerably, and, although some producers are still unable to satisfy the full requirements of their customers, other suitable irons can be obtained to make good this shortage. With the larger tonnages which will shortly be available from increased furnace capacity, overall supplies should be sufficient to meet the needs of the foundries. Production of hematite pig-iron has now been considerably increased to satisfy the larger demand.

The light foundries producing castings for domestic equipment and heating appliances, and for the building trades are reasonably well employed. The supply of high-phosphorus pig-iron to these foundries as well as to the textile, jobbing, and some of the engineering foundries which use this grade, is satisfactory. Producers of this iron have no difficulty in satisfying present demands and could step up deliveries if demands warranted. They continue to dispose of some of their surplus production to overseas buyers.

The foundries are receiving sufficient foundry coke to meet their requirements, and ganister, limestone, and firebricks are in good supply. Both iron and steel scrap is in good demand, particularly for the parcels which arise of heavy cast iron and machinery scrap.

The re-rollers continue well occupied and with the work on hand are able to obtain capacity outputs, although in some instances they are prevented from doing so by shortage of suitable labour. Demands are maintained at recent high levels for small bars and light sections, and pressure is sustained for reinforcing rods.

Home steelworks are heavily committed for steel semis, and although substantial tonnages are being supplied to the re-rollers, these in some instances are much below requirements. All arisings at the steelworks of suitable re-rolling defectives and crops are readily accepted by the re-rollers.

Non-ferrous Metals

The copper market in London has shown remarkable resilence after its great fall last week when the price dropped £11 a ton in one day—the biggest price break in three and a half years. Indeed, before the end of last week it had recovered nearly £10 a ton from its lowest point and this trend has continued this week in a less violent form. The underlying strength of the market appears to stem from lack of large supplies of prompt metal, relatively low stocks, and the concentration of a considerable demand on cash metal. Demand is satisfactory and inquiries are once more coming from the east European countries.

It appears that expectation outran realization after the settlement of the US strike and, although production on the other side of the Atlantic has made a quick recovery, the pipelines are not so full as was thought or hoped. In the longer term the London price structure—barring major strikes—must inevitably settle down at lower levels, but in the immediate market outlook demand can quite easily outrun reasonable availability with the result that prices can fluctuate sharply.

The US position is better in that the strike at the White Pine Copper Company has been settled, leaving only the Laurel Hill refinery strikebound. Demand is not as good as expected and the price of No. 2 scrap has dropped to 25½ cents a pound. In normal markets this would indicate a custom smelter price of around 31 cents a pound. Notwithstanding the market anomalies at present, it is difficult not to believe that the US price structure will be adjusted downwards—and soon. At present producers are quoting 33 cents and custom smelters 35 cents a pound.

Tin is quietly dull in London, featureless in New York, where the quotation is barely $1.01 cents a pound, and weak in the East, where the Singapore price has been sagging daily. The reason for this *volte face* is thought to be the drying up of US demand for metal from the East indicating that the tinplate industry has stocked up sufficiently to meet its short-term needs. The US position is still the key to this market and a consistently brighter Wall Street could give this market its required "shot in the arm."

Lead is firm in London with the cash price over £75 a ton. Demand is satisfactory and with producers imposing voluntary self-restraint on the supply position, the outlook is reasonably good for the market to at least hold its present price level. In New York the market is featureless, with the quotation holding at 12 cents a pound.

Zinc is an indifferent market in London, with business falling down to fairly low levels. The consumer is reluctant to build up his stocks of zinc because of the removal of the restrictions on availability and, generally speaking, demand is only for immediate needs. In the US the check to production in the steel and automobile industries has led to a slackening in demand, although the quotation is still unchanged at 13 cents a pound.

Disposals of Government Zinc

The Board of Trade announce that they intend to dispose of their remaining unsold stocks of zinc, amounting to about 53,000 tons. Of this about 35,000 tons consists of high-grade, 12,750 of special high-grade, and 5,250 of g.o.b. zinc. Considerable quantities are being sold or offered to the original suppliers or their agents, but of the remainder (about 12,000 tons), the Board of Trade is offering for sale by tender 3,100 tons of zinc for delivery and pricing between April and September, 1960. The progress of disposal of the rest of the zinc will depend on market conditions, but sales are expected to be completed within four years. Details and tender forms for the immediate sales will be available from the Board of Trade, I.M.4(3) Division, Lacon House, Theobalds Road, London, W.C.1 (phone CHA 4411, ext. 655) in a few days' time.

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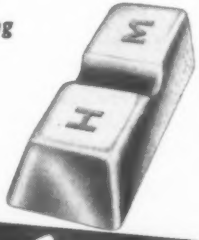

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PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 7s. 6d.; Birmingham, £25 14s. 0d.; Wales (Welsh iron), £23 19s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £41 10s. 0d. to £44 0s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £57 0s. 0d. to £62 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 12s. 0d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 15s. 0d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £78 10s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £77 0s 0d. to £80 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent, C,* 1s. 8½d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent. C,* 1s. 9¾d. to 2s. 0¾d. per lb. Cr; 0.06 per cent. C.* 1s. 10¼d. to 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta. 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £63 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (1 ton to 10 tons).—Ship plates, (N.-E. Coast), £41 12s. 0d.; boiler plates (N.-E. Coast), £44 2s. 0d.; floor plates (N.-E. Coast), £43 10s. 0d.; angles (N.-E. Coast), £38 16s. 6d.; joists (N.-E. Coast), £38 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d., nickel-chrome, £99 4s. 0d.; nickel-chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £256 10s. 0d. to £257 0s. 0d.; three months, £239 5s. 0d. to £239 10s. 0d.; settlement, £257 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 5⅝d. per lb.; rods, 272s. 6d. per cwt. basis; 20 s.w.g., 307s. 6d. per cwt.

Tin.—Cash, £788 10s. 0d. to £789 10s. 0d.; three months £788 0s. 0d. to £788 10s. 0d.; settlement, £789 10s. 0d.

Lead (Refined Pig).—First half March, £75 2s. 6d. to £75 5s. 0d.; first half June, £74 5s. 0d. to £74 7s. 6d.

Zinc.—First half March, £87 7s. 6d. to £87 10s. 0d.; first half June, £87 7s. 6d. to £87 10s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £122 5s. 0d.; rolled zinc (boiler plates), all English destinations, £120 0s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £100 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 0¾d. per lb.; sheets to 10 w.g., 218s. 9d. per cwt.; wire, 2s. 10d.; rolled metal, 218s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £164; B6, £219.

Brass (High Tensile).—BS1400, HTB1, £197; HTB2, £214; HTB3, £229.

Gunmetal.—BS1400, LG2, £207; LG3, £216; G1, ½%, £273; G1, 1%, £261.

Phosphor Bronze.—BS1400, PB1 (AID released), £309; BS1400, 90/10/1, £290.

Leaded Phosphor Bronze.—BS1400, LPB1, £227.

Phosphor Bronze Strip, etc.—Strip, 312s. 3d. per cwt.; wire, 4s. 3½d. per lb.; rods, 3s. 6¼d.; tubes, 3s. 7½d.; chill cast bars; solids 3s. 6d.; cored 3s. 7d. (CHARLES CLIFFORD, LIMITED.)

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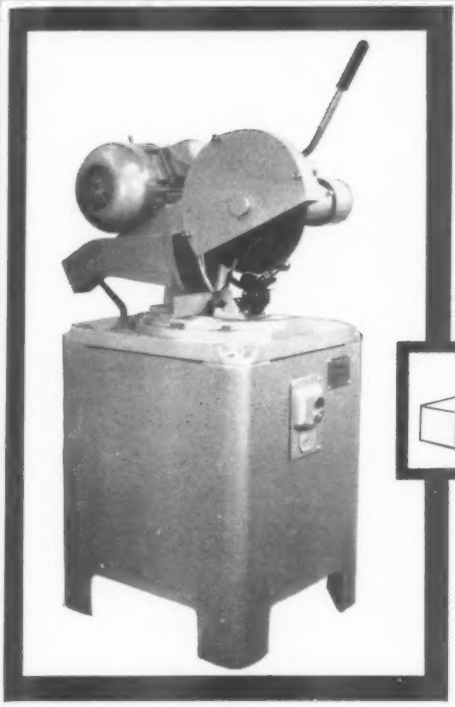
* Average 68–70 per cent.



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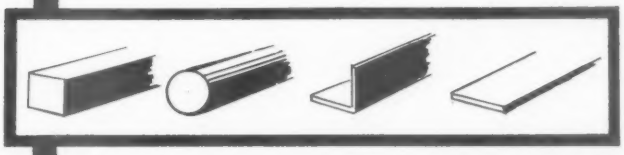

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SITUATIONS WANTED

FOUNDRYMAN, 24, seeks position with good prospects, technical or production. National Foundry College Diploma, time-served patternmaker with excellent all-round Foundry training in cast iron and non-ferrous jobbing. London or Home Counties. Box FT433, FOUNDRY TRADE JOURNAL.

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METALLURGICAL CHEMIST required to take charge of laboratory employing people on Chemical and Metallurgical Analysis in connection with a large Iron Foundry situated in a pleasant area of the South Coast. Housing available. Please reply in writing, stating age, experience and salary required. Box MC438, FOUNDRY TRADE JOURNAL.

WORKS MANAGER with experience in heavy engineering and foundry work required by small company in South Wales. Minimum qualification H.N.C. Contributory Pension Scheme. Apply, stating full particulars and salary required, to Box WM439, FOUNDRY TRADE JOURNAL.

ASSISTANT to Foundry Manager required by Jobbing Foundry, South Eastern district. Estimating experience an advantage. Write, giving details of practical and technical knowledge, age and salary required, to Box AT436, FOUNDRY TRADE JOURNAL.

METALLURGIST—qualified. Age approximately 28 to 40. Experienced Electric Furnace Melting. Required to take charge of Laboratory and expand Laboratory services to Foundry. Good prospects for capable person. Apply WORKS MANAGER, THE WEST LOTHIAN STEEL FOUNDRY CO., LTD., Hardhill Works, Armadale, West Lothian.

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METHODS SPECIALIST: Methods Specialist required for large Iron Foundry in West of Scotland (Glasgow area). Applicants should be aged 24/35 and possess a good practical and technical background. There are excellent prospects for a person of initiative. Staff conditions, excellent canteen and good travelling facilities. Apply Box MS424, FOUNDRY TRADE JOURNAL.

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1—"Polford" Oil Fired, Crucible Tilting Furnace, 250 capacity, complete with Blower Fan, 1½ h.p. Motor, suitable for 440/3/50 supply.
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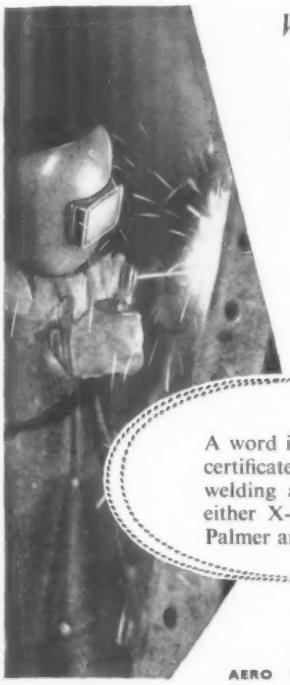

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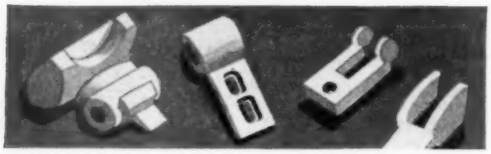

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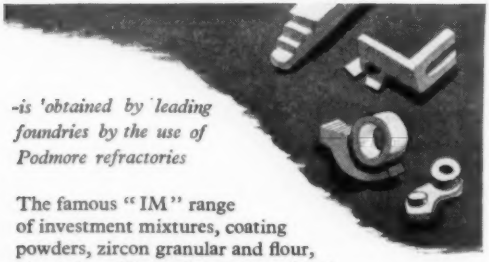

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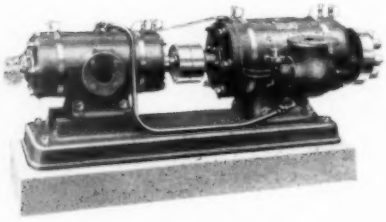

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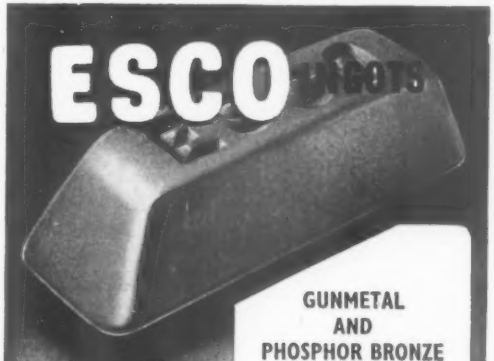

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